GE Medical Systems

Technical Publication

Direction 2300749-100
Revision 2

GE Medical Systems
LOGIQ™ 3 Service Manual

Operating Documentation

ADVANCED SERVICE DOCUMENTATION
PROPERTY OF GE
FOR GE SERVICE PERSONNEL ONLY
NO RIGHTS LICENSED - DO NOT USE OR COPY
DISCLOSURE TO THIRD PARTIES PROHIBITED

Copyright© 2003 by General Electric Co.

Important Precautions

Language

- **THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.**
- **IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.**

WARNING

- **DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.**
- **FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.**

- **CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS.**
- **SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.**

AVERTISSEMENT

- **NE PAS TENTER D'INTERVENTION SUR LES ÉQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ÉTÉ CONSULTÉ ET COMPRIS.**
- **LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L'OPÉRATEUR OU LE PATIENT DES BLESSURES DUES À DES DANGERS ÉLECTRIQUES, MÉCANIQUES OU AUTRES.**

- **DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.**
- **FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.**

WARNUNG

- **VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST-HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.**
- **WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.**

AVISO

- **ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS.**
- **SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.**
- **NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.**
- **LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.**

ATENÇÃO

- **ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.**
- **SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEMS, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.**
- **NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.**
- **O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A‘ CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.**

AVVERTENZA

- **IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.**
- **SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEMS RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.**
- **SI PROCEDA ALLA MANUTENZIONE DELL’APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.**
- **NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL’ADDETTO ALLA MANUTENZIONE, ALL’UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.**

このサービスマニュアルには英語版しかありません。
ＧＥＭＳ以外でサービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。

警告

このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないで下さい。
この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

本维修手册仅存有英文本。
非 GEMS 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。

注意:

未详细阅读和完全了解本手册之前，不得进行维修。忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent write “Damage In Shipment” on ALL copies of the freight or express bill BEFORE delivery is accepted or “signed for” by a GE representative or hospital receiving agent. Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.

Call Traffic and Transportation, Milwaukee, WI (262) 785-5052 or 8*323 5052 immediately after damage is found. At this time be ready to supply name of carrier, delivery date, consignee name, freight or express bill number, item damaged and extent of damage.

Complete instructions regarding claim procedure are found in Section S of the Policy And Procedures Bulletins.

CERTIFIED ELECTRICAL CONTRACTOR STATEMENT

All electrical Installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations and testing shall be performed by qualified GE Medical personnel. In performing all electrical work on these products, GE will use its own specially trained field engineers. All of GE’s electrical work on these products will comply with the requirements of the applicable electrical codes.

The purchaser of GE equipment shall only utilize qualified personnel (i.e., GE’s field engineers, personnel of third-party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

OMISSIONS & ERRORS

If there are any omissions, errors or suggestions for improving this documentation, please contact the GE Medical Systems Global Documentation Group with specific information listing the system type, manual title, part number, revision number, page numer and suggestion details. E-mail the information to : UltrasoundDocError@med.ge.com.

GE Medical Systems employees should use the iTrak System to report all documentation errors or omissions.

Revision History

Revision	Date	Reason for change
0	March 30, 2003	Initial Release
1	October 25, 2003	First Upgrade to M4 Level
2	April 27, 2004	Final Upgrade to M4 level

List of Effected Pages

Pages	Revision	Pages	Revision	Pages	Revision
Title Page	2	Chapter 2 - Pre-Installation (pages 2-1 to 2-12)	2	Chapter 7 - Diagnostics/Troubleshooting (pages 7-1 to 7-48)	2
Important Precautions (pages i to iv)	2	Chapter 3 - Installation (pages 3-1 to 3-56)	2	Chapter 8 - Replacement Procedures (pages 8-1 to 8-108)	2
Rev History/LOEP (pages v to vi)	2	Chapter 4 - Functional Checks (pages 4-1 to 4-32)	2	Chapter 9 - Replacement Parts (pages 9-1 to 9-16)	2
Table of Contents (pages vii to xxii)	2	Chapter 5 - Theory (pages 5-1 to 5-42)	2	Chapter 10 - Periodic Maintenance (pages 10-1 to 10-30)	2
Chapter 1 - Introduction (pages 1-1 to 1-18)	2	Chapter 6 - Service Adjustments (pages 6-1 to 6-4)	2	Index (pages I-II)	2

This Page was Intentionally Left Blank

CHAPTER 1

Overview . . . . . 1 - 1
Purpose of Chapter 1 . . . . . 1 - 1
Chapter Contents . . . . . 1 - 1
Purpose of Service Manual . . . . . 1 - 1
Typical Users of the Basic Service Manual . . . . . 1 - 2
LOGIQ™ 3 Models Covered by this Manual . . . . . 1 - 2
Purpose of Operator Manual(s) . . . . . 1 - 2

Safety . . . . . 1 - 3
Warnings . . . . . 1 - 3

Important Conventions . . . . . 1 - 4
Conventions Used in Book . . . . . 1 - 4
Standard Hazard Icons . . . . . 1 - 5
Product Icons . . . . . 1 - 6

Safety Considerations . . . . . 1 - 8
Introduction . . . . . 1 - 8
Human Safety . . . . . 1 - 8
Mechanical Safety . . . . . 1 - 8
Electrical Safety . . . . . 1 - 9
Returning/Shipping Probes and Repair Parts . . . . . 1 - 9
Labels Locations . . . . . 1 - 10
Dangerous Procedure Warnings . . . . . 1 - 14
Lockout/Tagout Requirements (For USA / Europe Only) . . . . . 1 - 14
. . . . . .
EMC, EMI, and ESD . . . . . 1 - 15
Electromagnetic Compatibility . . . . . 1 - 15
Electrostatic Discharge (ESD) Prevention . . . . . 1 - 15
CE Compliance . . . . . 1 - 15

Customer Assistance . . . . . 1 - 16
Contact Information . . . . . 1 - 16
System Manufacturer . . . . . 1 - 17

CHAPTER 2

Overview . . . . . 2 - 1
Purpose of Chapter 2 . . . . . 2 - 1
Chapter Contents . . . . . 2 - 1

General Console Requirements. . . . . 2 - 2
Console Environmental Requirements . . . . . 2 - 2
. . . . . 2 - 2
Cooling . . . . . 2 - 2
Lighting . . . . . 2 - 2
Electrical Requirements . . . . . 2 - 3
Power Requirements . . . . . 2 - 3
Inrush Current . . . . . 2 - 3
Site Circuit Breaker . . . . . 2 - 3
Site Power Outlets . . . . . 2 - 4
Unit Power Plug . . . . . 2 - 4
Power Stability Requirements . . . . . 2 - 4
EMI Limitations . . . . . 2 - 5
Probes Environmental Requirements . . . . . 2 - 6
Time and Manpower Requirements . . . . . 2 - 6

Facility Needs . . . . . 2 - 7
Purchaser Responsibilities . . . . . 2 - 7
Required Features . . . . . 2 - 7
Desirable Ultrasound Room Facilities . . . . . 2 - 8
Minimal Floor Plan Suggestion . . . . . 2 - 9
Networking Pre-installation Requirements . . . . . 2 - 10
Purpose of DICOM Network Function . . . . . 2 - 10
DICOM Option Pre-installation Requirements . . . . . 2 - 10

CHAPTER 3

Overview . . . . . 3 - 1
Purpose of Chapter 3 . . . . . 3 - 1
Chapter Contents . . . . . 3 - 1
Average Installation Time . . . . . 3 - 2
Installation Warnings . . . . . 3 - 2

Receiving and Unpacking LOGIQ™ 3 . . . . . 3 - 3
Safety Reminders . . . . . 3 - 7
Moving into Position . . . . . 3 - 8
Adjusting System Clock . . . . . 3 - 8
Product Locator Installation Card . . . . . 3 - 8

Preparing for Installation . . . . . 3 - 9
Verify Customer Order . . . . . 3 - 9
Physical Inspection . . . . . 3 - 9
Systems Voltage Settings . . . . . 3 - 9
Video Formats . . . . . 3 - 9
EMI Protection . . . . . 3 - 9
Checking the Components . . . . . 3 - 9

Completing the Installation . . . . . 3 - 10
System Specifications . . . . . 3 - 10
Physical Dimensions . . . . . 3 - 10
Weight with Monitor and without Peripherals . . . . . 3 - 12
Acoustic Noise Output: . . . . . 3 - 12
Electrical Specifications . . . . . 3 - 12
Probe (Transducer) Connection . . . . . 3 - 12
Power On / Boot Up . . . . . 3 - 12
Scanner Power On . . . . . 3 - 12
Back-end Processor Boot Up . . . . . 3 - 14
Power Off/ Shutdown . . . . . 3 - 14
Back-end Processor Power Down . . . . . 3 - 14
Scanner Shutdown . . . . . 3 - 15

System Configuration . . . . . 3 - 16
System Configuration . . . . . 3 - 16
System Settings . . . . . 3 - 16

Storage And Operation Requirements . . . . . 3 - 18

Optional Peripherals . . . . . 3 - 19
Optional Peripherals/Peripheral Connection . . . . . 3 - 19

Approved peripherals . . . . . 3 - 19
Connecting Cables . . . . . 3 - 20
Power Consumption of Optional Peripherals . . . . . 3 - 21
Available Probes . . . . . 3 - 22
Peripherals/Accessories Connector Panel . . . . . 3 - 22
Video Specification . . . . . 3 - 30

Software Option Configuration . . . . . 3 - 31

Connectivity Installation Worksheet . . . . . 3 - 32

InSite IP Address Configuration . . . . . 3 - 33

Loading Base System Software . . . . . 3 - 33
Before You Load Software . . . . . 3 - 33
Managing Data, Presets and Images . . . . . 3 - 33
Base Load Software Load Procedure For BEP Ver 2.0 . . . . . 3 - 34
Base Load Software Load Procedure For BEP Ver 1.0 . . . . . 3 - 37
Optional Check Devices . . . . . 3 - 39
Optional Procedure for Changing (Re-mapping) Drive Letters . . . . . 3 - 41

Loading Application Software . . . . . 3 - 45
Loading Applications Software . . . . . 3 - 45
Possible Behavior of the First Power Up After Application Load . . . . . 3 - 47
Possible GE USB Control Panel Driver Loss . . . . . 3 - 48
System Setup . . . . . 3 - 51
Upgrading Application Software . . . . . 3 - 52
Possible Behavior of the First Power Up After Application Load . . . . . 3 - 54
GE USB Control Panel Driver Loss . . . . . 3 - 54
System Setup . . . . . 3 - 58
Restore Patient, Report, and User-Defined Presets . . . . . 3 - 58

Paperwork . . . . . 3 - 59
Product Locator Installation . . . . . 3 - 59
GE Cares Sticker . . . . . 3 - 60
User Manual(s) . . . . . 3 - 60

CHAPTER 4

Overview . . . . . 4 - 1
Purpose of Chapter 4 . . . . . 4 - 1
Chapter Contents . . . . . 4 - 1

Required Equipment . . . . . 4 - 1

General Procedure . . . . . 4 - 2
Power On/Boot Up . . . . . 4 - 2
Scanner Power On . . . . . 4 - 2
Power Off . . . . . 4 - 4
Power Shutdown . . . . . 4 - 4
Using CD-RW Drive/MOD Drive (Optional) . . . . . 4 - 4
Using CD-RW . . . . . 4 - 4
Using MOD (Optional) . . . . . 4 - 5
Archiving and Loading Presets . . . . . 4 - 7
Formatting CD(R/W)/MO Disk . . . . . 4 - 7
Archiving Presets to an CD(R/W)/MO Disk . . . . . 4 - 8
Loading Presets from an CD(R/W)/MO disk . . . . . 4 - 9
Adjusting the Display Monitor . . . . . 4 - 10
Brightness and Contrast . . . . . 4 - 10
Manual Degauss . . . . . 4 - 10
Lockout/Tagout Requirements (For USA/Europe Only) . . . . . 4 - 10

Functional Checks . . . . . 4 - 11
Basic Controls . . . . . 4 - 11
Alpha Numeric Keyboard . . . . . 4 - 11
Keyboard Controls . . . . . 4 - 11
Top and Sub Menu . . . . . 4 - 11
B Mode Checks . . . . . 4 - 12
Preparations . . . . . 4 - 12
B Mode OP Panel Controls . . . . . 4 - 13
B Mode Top and Sub menu Controls . . . . . 4 - 14
M Mode Controls . . . . . 4 - 15
Preparations . . . . . 4 - 15
M Mode OP Panel Controls . . . . . 4 - 16
M Mode Top and Sub menu Controls . . . . . 4 - 17
Color Flow Mode Checks . . . . . 4 - 18
Preparations . . . . . 4 - 18
Color Flow Mode OP Panel Controls . . . . . 4 - 19
Color Flow Mode Top and Sub Menu Controls . . . . . 4 - 19
Doppler Mode Checks . . . . . 4 - 20
Preparations . . . . . 4 - 20
Doppler Mode OP Panel Controls . . . . . 4 - 21

Doppler Mode Top and Sub Menu Controls . . . . . 4 - 21
Measurement and Multi Image Checks . . . . . 4 - 22
Performing B Mode Measurements Checks . . . . . 4 - 22
Basic Measurements . . . . . 4 - 23
Distance and Tissue Depth Measurements . . . . . 4 - 23
Circumference/Area (Ellipse) Measurement . . . . . 4 - 23
Worksheets . . . . . 4 - 24
Report Pages . . . . . 4 - 24
Probe/Connectors Usage . . . . . 4 - 24
Connecting a probe . . . . . 4 - 24
Activating the probe . . . . . 4 - 24
Deactivating the probe . . . . . 4 - 25
Disconnecting the probe . . . . . 4 - 25
Using Cine . . . . . 4 - 25
Activating CINE . . . . . 4 - 25
Quickly Move to Start/End Frame . . . . . 4 - 25
Start Frame/End Frame . . . . . 4 - 25
Adjusting the CINE Loop Playback Speed . . . . . 4 - 25
Moving through a CINE Loop Frame By Frame . . . . . 4 - 25
Image Management (QG) . . . . . 4 - 26
Back End Processor Checks . . . . . 4 - 26

Software Configuration Checks . . . . . 4 - 27

Peripheral Checks . . . . . 4 - 28

Safety Issues . . . . . 4 - 29
Probe/Connectors Check . . . . . 4 - 29
Power Supply Adjustment . . . . . 4 - 29

Site Log . . . . . 4 - 30

CHAPTER 5

Overview . . . . . 5 - 1
Purpose of Chapter 5 . . . . . 5 - 1
General Information . . . . . 5 - 2
System Features . . . . . 5 - 2
Types of Applications . . . . . 5 - 2

Block Diagrams and Theory . . . . . 5 - 4
Block Diagram . . . . . 5 - 4
Front End . . . . . 5 - 5
Mid Processors . . . . . 5 - 6
CPU/Backend Processor . . . . . 5 - 7
VIC Card . . . . . 5 - 8
Patient I/O (Option) . . . . . 5 - 9
Keyboard . . . . . 5 - 9
Monitor . . . . . 5 - 10

External I/O on the Rear Panel . . . . . 5 - 10

Peripherals . . . . . 5 - 10
Interconnect Cabling . . . . . 5 - 11

Power Diagrams . . . . . 5 - 13
Overview . . . . . 5 - 13
AC Power . . . . . 5 - 13
DC Power (Low Voltage) . . . . . 5 - 14
TX Power/HV Power Supply . . . . . 5 - 15
Overview . . . . . 5 - 15
Specifications . . . . . 5 - 15
Output Signal to FEC . . . . . 5 - 15
Input Signal from FEC . . . . . 5 - 15

Circuit Boards Descriptions . . . . . 5 - 16
Front End . . . . . 5 - 17
Connector Board . . . . . 5 - 17
Overview . . . . . 5 - 17
Interface to Probe . . . . . 5 - 17
IIC bus . . . . . 5 - 18
Transmit Board . . . . . 5 - 18
Overview . . . . . 5 - 18
Key Features . . . . . 5 - 19
CWD Board . . . . . 5 - 19
Receive Board . . . . . 5 - 20

Digital Beam Former . . . . . 5 - 21
Overview . . . . . 5 - 21
Control Part . . . . . 5 - 21
Mid Processors . . . . . 5 - 22
FEC . . . . . 5 - 22
Overview . . . . . 5 - 22
THI Board . . . . . 5 - 24
PC2IP Board . . . . . 5 - 25
CPU/Back End Processor . . . . . 5 - 26
PC BOX . . . . . 5 - 26
Rear Panel . . . . . 5 - 27
Safety . . . . . 5 - 28
Printer (Camera) Remote Control Interface . . . . . 5 - 28

Mechanical Descriptions . . . . . 5 - 28
Monitor . . . . . 5 - 28

Air Flow Control . . . . . 5 - 29
Air Flow Distribution . . . . . 5 - 29
Filters . . . . . 5 - 29
Fans . . . . . 5 - 29

Common Service Platform . . . . . 5 - 30
Introduction . . . . . 5 - 30
iLinq Interactive Platform Features . . . . . 5 - 30
Web Server/Browser . . . . . 5 - 30
Connectivity . . . . . 5 - 30
Configuration . . . . . 5 - 30
Contact GE . . . . . 5 - 30
Interactive Application . . . . . 5 - 30
Global Service User Interface (GSUI) . . . . . 5 - 31
Internationalization . . . . . 5 - 31
Service Login . . . . . 5 - 31
Access / Security . . . . . 5 - 31
Service Home Page . . . . . 5 - 32
Error Logs Page . . . . . 5 - 33
Logs . . . . . 5 - 34
Utilities . . . . . 5 - 35
Search . . . . . 5 - 36
Filter . . . . . 5 - 36
Exit . . . . . 5 - 36
Diagnostics . . . . . 5 - 37
Diagnostics Execution . . . . . 5 - 38
Diagnostic Reports . . . . . 5 - 38
Proactive Diagnostics . . . . . 5 - 38
Image Quality . . . . . 5 - 39

Calibration . . . . . 5 - 39
Configuration . . . . . 5 - 40
Utilities . . . . . 5 - 41
Replacement . . . . . 5 - 42
PM . . . . . 5 - 43

CHAPTER 6

Overview . . . . . 6 - 1
Purpose of Chapter 6 . . . . . 6 - 1

Regulatory . . . . . 6 - 1

Power Supply Adjustments . . . . . 6 - 1
Access to Adjustments for LV Power Supply . . . . . 6 - 1
Adjustments Procedures . . . . . 6 - 3

Monitor Adjustment . . . . . 6 - 4

CHAPTER 7

Overview . . . . . 7 - 1
Purpose of Chapter 7 . . . . . 7 - 1
Diagnostic Procedure Summary . . . . . 7 - 1

Gathering Trouble Data . . . . . 7 - 2
Overview . . . . . 7 - 2
Collect Vital System Information . . . . . 7 - 2
Collect a Trouble Image with Logs . . . . . 7 - 3

Screen Captures . . . . . 7 - 4
Check and Record the P4 Key Function . . . . . 7 - 4
Setting the P4 Key to Screen Capture . . . . . 7 - 5
Capturing a Screen . . . . . 7 - 6
Reset the P4 Key to Customer's Functionality . . . . . 7 - 7

Diagnostics . . . . . 7 - 8
Automatic Troubleshooting . . . . . 7 - 8
Reliability Testing . . . . . 7 - 12

Common Diagnostics . . . . . 7 - 13
Utilities . . . . . 7 - 13
PC Diagnostics (Non-Interactive Tests) . . . . . 7 - 13
CPU Tests . . . . . 7 - 13
Hard Drive Tests . . . . . 7 - 14
Memory Tests . . . . . 7 - 14
CD-ROM Drive Tests . . . . . 7 - 14
Video Test . . . . . 7 - 14
USB Test . . . . . 7 - 15
PCI Board Configuration Test . . . . . 7 - 15
PC Diagnostics (Interactive Tests) . . . . . 7 - 15
Keyboard Test . . . . . 7 - 15
Audio Test . . . . . 7 - 15

LOGIQ™ 3 Diagnostic Descriptions . . . . . 7 - 17
Troubleshooting . . . . . 7 - 17
FRU Test . . . . . 7 - 18
FEC . . . . . 7 - 18
Conn. Board . . . . . 7 - 19
RXB . . . . . 7 - 19
TXB . . . . . 7 - 20
DBF . . . . . 7 - 20
VIC . . . . . 7 - 21
OP Panel . . . . . 7 - 21

LED Descriptions . . . . . 7 - 22
TX Board . . . . . 7 - 22
DBF Board . . . . . 7 - 22
FEC Board . . . . . 7 - 22
CONN Board . . . . . 7 - 23
BackPlane Board . . . . . 7 - 23

View Logs . . . . . 7 - 24
Error Reporting . . . . . 7 - 24

Troubleshooting . . . . . 7 - 25
System Doesn't Boot . . . . . 7 - 25
Drive Issue HD . . . . . 7 - 28
Unable to Scan . . . . . 7 - 29
Structured Artifact in the image . . . . . 7 - 30
B Mode Low Sensitivity . . . . . 7 - 32
B Mode Low Image Quality . . . . . 7 - 33
Noise in B Mode . . . . . 7 - 34
Color Flow Low Sensitivity . . . . . 7 - 35
Doppler Low Sensitivity . . . . . 7 - 36
Noise in Color Flow . . . . . 7 - 37
Trackball . . . . . 7 - 38
Monitor Troubleshooting . . . . . 7 - 38
Brake Lock Does Not Operate Properly . . . . . 7 - 41
Unable Recording by VCR . . . . . 7 - 42
Unable Recording by Printer . . . . . 7 - 43
Drive Issue CD-RW . . . . . 7 - 45
Network Troubleshooting Trees . . . . . 7 - 46
No Connection to the Network at All . . . . . 7 - 46
No Contact With Server, But Connection to Network is OK . . . . . 7 - 46
7-9-17 . . . . . .Network
Troubleshooting Trees (cont'd) . . . . . 7 - 47

CHAPTER 8

Overview . . . . . 8 - 1
Purpose of Chapter 8 . . . . . 8 - 1
Returning/Shipping Probes and Repair Parts . . . . . 8 - 1

Monitor . . . . . 8 - 3
Monitor Assy (FRU No. 100) . . . . . 8 - 3
Tools . . . . . 8 - 3
Needed Manpower . . . . . 8 - 3
Preparations . . . . . 8 - 3
Removal procedure . . . . . 8 - 3
Mounting procedure . . . . . 8 - 3
Monitor Cover Left (FRU No. 101) . . . . . 8 - 4
Tools . . . . . 8 - 4
Needed Manpower . . . . . 8 - 4
Preparations . . . . . 8 - 4
Removal Procedure . . . . . 8 - 4
Monitor Cover Right (FRU No. 102) . . . . . 8 - 5
Tools . . . . . 8 - 5
Needed Manpower . . . . . 8 - 5
Preparations . . . . . 8 - 5
Removal Procedure . . . . . 8 - 5
Monitor Cover Top (FRU No. 103) . . . . . 8 - 6
Tools . . . . . 8 - 6
Needed Manpower . . . . . 8 - 6
Preparations . . . . . 8 - 6
Removal Procedure . . . . . 8 - 6
Monitor Cover Front (Bezel) (FRU No. 104) . . . . . 8 - 7
Tools . . . . . 8 - 7
Needed Manpower . . . . . 8 - 7
Preparations . . . . . 8 - 7
Removal Procedure . . . . . 8 - 7
Monitor Switch (S/W) Assy (FRU No. 105) . . . . . 8 - 8
Tools . . . . . 8 - 8
Needed Manpower . . . . . 8 - 8
Preparations . . . . . 8 - 8
Removal Procedure . . . . . 8 - 8
Mounting procedure . . . . . 8 - 8
Task Lamp (FRU No. 106) . . . . . 8 - 9
Tools . . . . . 8 - 9
Needed Manpower . . . . . 8 - 9
Preparations . . . . . 8 - 9
Removal Procedure . . . . . 8 - 9
Mounting procedure . . . . . 8 - 9

Keyboard . . . . . 8 - 10
KeyBoard Assy (FRU No. 200) . . . . . 8 - 10
Tools . . . . . 8 - 10
Needed Manpower . . . . . 8 - 10
Preparations . . . . . 8 - 10
Removal Procedure . . . . . 8 - 10
Mounting procedure . . . . . 8 - 10
Probe Holder (FRU No. 201) . . . . . 8 - 12
Tools . . . . . 8 - 12
Needed Manpower . . . . . 8 - 12
Preparations . . . . . 8 - 12
Removal Procedure . . . . . 8 - 12
Mounting procedure . . . . . 8 - 12
Keyboard TGC Assy (FRU No. 202) . . . . . 8 - 13
Tools . . . . . 8 - 13
Needed Manpower . . . . . 8 - 13
Preparations . . . . . 8 - 13
Removal Procedure . . . . . 8 - 13
Mounting procedure . . . . . 8 - 13
HUB PCB Assy (FRU No. 203) . . . . . 8 - 14
Tools . . . . . 8 - 14
Needed Manpower . . . . . 8 - 14
Preparations . . . . . 8 - 14
Removal Procedure . . . . . 8 - 14
Mounting procedure . . . . . 8 - 14
A/N Keyboard Assy (FRU No. 204) . . . . . 8 - 15
Tools . . . . . 8 - 15
Needed Manpower . . . . . 8 - 15
Preparations . . . . . 8 - 15
Removal Procedure . . . . . 8 - 15
Mounting procedure . . . . . 8 - 15
Keyboard Trackball Assy (FRU No. 205) . . . . . 8 - 16
Tools . . . . . 8 - 16
Needed Manpower . . . . . 8 - 16
Preparations . . . . . 8 - 16
Removal Procedure . . . . . 8 - 16
Mounting procedure . . . . . 8 - 16
Keyboard - Freeze Key Assy (FRU No. 206) . . . . . 8 - 17
Tools . . . . . 8 - 17
Needed Manpower . . . . . 8 - 17
Preparations . . . . . 8 - 17
Removal Procedure . . . . . 8 - 17
Mounting procedure . . . . . 8 - 17
Power switch and Encoder PCB Assy (FRU 207). . . . . 8 - 18
Tools . . . . . 8 - 18
Needed Manpower . . . . . 8 - 18

Preparations . . . . . 8 - 18
Removal Procedure . . . . . 8 - 18
Mounting procedure . . . . . 8 - 18
Keyboard Power Cable (FRU 208). . . . . 8 - 19
Tools . . . . . 8 - 19
Needed Manpower . . . . . 8 - 19
Preparations . . . . . 8 - 19
Removal Procedure . . . . . 8 - 19
Mounting procedure . . . . . 8 - 19

Mechanicals . . . . . 8 - 20
Right Cover (FRU No. 300) . . . . . 8 - 20
Tools . . . . . 8 - 20
Needed Manpower . . . . . 8 - 20
Preparations . . . . . 8 - 20
Removal Procedure . . . . . 8 - 20
Mounting procedure . . . . . 8 - 20
Left Cover (FRU No. 301) . . . . . 8 - 21
Tools . . . . . 8 - 21
Needed Manpower . . . . . 8 - 21
Preparations . . . . . 8 - 21
Removal Procedure . . . . . 8 - 21
Mounting procedure . . . . . 8 - 21
Rear Cover (FRU No. 302) . . . . . 8 - 22
Tools . . . . . 8 - 22
Needed Manpower . . . . . 8 - 22
Preparations . . . . . 8 - 22
Removal Procedure . . . . . 8 - 22
Mounting procedure . . . . . 8 - 22
Front Bumper (FRU No. 303) . . . . . 8 - 23
Tools . . . . . 8 - 23
Needed Manpower . . . . . 8 - 23
Preparations . . . . . 8 - 23
Removal Procedure . . . . . 8 - 23
Mounting procedure . . . . . 8 - 23
Front Rubber Bumper Left (FRU No. 311) . . . . . 8 - 24
Tools . . . . . 8 - 24
Needed Manpower . . . . . 8 - 24
Preparations . . . . . 8 - 24
Removal Procedure . . . . . 8 - 24
Mounting procedure . . . . . 8 - 24
Front Rubber Bumper Right (FRU No. 312) . . . . . 8 - 25
Tools . . . . . 8 - 25
Needed Manpower . . . . . 8 - 25
Preparations . . . . . 8 - 25
Removal Procedure . . . . . 8 - 25

Mounting procedure . . . . . 8 - 25
Front Cover (FRU No. 304) . . . . . 8 - 26
Tools . . . . . 8 - 26
Needed Manpower . . . . . 8 - 26
Preparations . . . . . 8 - 26
Removal Procedure . . . . . 8 - 26
Mounting procedure . . . . . 8 - 26
Top Cover (FRU No. 305) . . . . . 8 - 27
Tools . . . . . 8 - 27
Needed Manpower . . . . . 8 - 27
Preparations . . . . . 8 - 27
Removal Procedure . . . . . 8 - 27
Mounting procedure . . . . . 8 - 27
KeyBoard Bottom Cover (FRU No. 306) . . . . . 8 - 28
Tools . . . . . 8 - 28
Needed Manpower . . . . . 8 - 28
Preparations . . . . . 8 - 28
Removal Procedure . . . . . 8 - 28
Mounting procedure . . . . . 8 - 28
KeyBoard Bumper (FRU No. 307) . . . . . 8 - 29
Tools . . . . . 8 - 29
Needed Manpower . . . . . 8 - 29
Preparations . . . . . 8 - 29
Removal Procedure . . . . . 8 - 29
Mounting procedure . . . . . 8 - 29
Keyboard Rear Cover (FRU No. 308) . . . . . 8 - 30
Tools . . . . . 8 - 30
Needed Manpower . . . . . 8 - 30
Preparations . . . . . 8 - 30
Removal Procedure . . . . . 8 - 30
Mounting procedure . . . . . 8 - 30
Left EMI Cover . . . . . 8 - 31
Tools . . . . . 8 - 31
Needed Manpower . . . . . 8 - 31
Preparations . . . . . 8 - 31
Removal Procedure . . . . . 8 - 31
Mounting procedure . . . . . 8 - 31
Right EMI Cover . . . . . 8 - 32
Tools . . . . . 8 - 32
Needed Manpower . . . . . 8 - 32
Preparations . . . . . 8 - 32
Removal Procedure . . . . . 8 - 32
Mounting procedure . . . . . 8 - 32
Rear EMI Cover . . . . . 8 - 33
Tools . . . . . 8 - 33
Needed Manpower . . . . . 8 - 33

Preparations . . . . . 8 - 33
Removal Procedure . . . . . 8 - 33
Mounting procedure . . . . . 8 - 33
Nest EMI Cover . . . . . 8 - 34
Tools . . . . . 8 - 34
Needed Manpower . . . . . 8 - 34
Preparations . . . . . 8 - 34
Removal Procedure . . . . . 8 - 34
Mounting procedure . . . . . 8 - 34
Front EMI Cover . . . . . 8 - 35
Tools . . . . . 8 - 35
Needed Manpower . . . . . 8 - 35
Preparations . . . . . 8 - 35
Removal Procedure . . . . . 8 - 35
Mounting procedure . . . . . 8 - 35
VGP Tray . . . . . 8 - 36
Tools . . . . . 8 - 36
Needed Manpower . . . . . 8 - 36
Preparations . . . . . 8 - 36
Removal Procedure . . . . . 8 - 36
Mounting procedure . . . . . 8 - 36
Handle Rod(FRU No. 400) . . . . . 8 - 37
Tools . . . . . 8 - 37
Needed Manpower . . . . . 8 - 37
Preparations . . . . . 8 - 37
Removal Procedure . . . . . 8 - 37
Mounting procedure . . . . . 8 - 37
Front Castor (FRU No. 401) . . . . . 8 - 38
Tools . . . . . 8 - 38
Needed Manpower . . . . . 8 - 38
Preparations . . . . . 8 - 38
Removal Procedure . . . . . 8 - 38
Mounting procedure . . . . . 8 - 38
Rear Castor (FRU No. 402) . . . . . 8 - 40
Tools . . . . . 8 - 40
Needed Manpower . . . . . 8 - 40
Preparations . . . . . 8 - 40
Removal Procedure . . . . . 8 - 40
Mounting procedure . . . . . 8 - 40
Air Filter (FRU No. 403) . . . . . 8 - 41
Tools . . . . . 8 - 41
Needed Manpower . . . . . 8 - 41
Preparations . . . . . 8 - 41
Removal Procedure . . . . . 8 - 41
Mounting procedure . . . . . 8 - 41
Card Cage Fan Assy (FRU No. 404) . . . . . 8 - 42

Tools . . . . . 8 - 42
Needed Manpower . . . . . 8 - 42
Preparations . . . . . 8 - 42
Removal Procedure . . . . . 8 - 42
Mounting procedure . . . . . 8 - 42

I/O Interfaces . . . . . 8 - 43
Rear Panel Assy (FRU No. 500) . . . . . 8 - 43
Tools . . . . . 8 - 43
Needed Manpower . . . . . 8 - 43
Preparations . . . . . 8 - 43
Removal Procedure . . . . . 8 - 43
Mounting procedure . . . . . 8 - 43
Rear Panel1 (RP1) Board (FRU No. 501) . . . . . 8 - 44
Tools . . . . . 8 - 44
Needed Manpower . . . . . 8 - 44
Preparations . . . . . 8 - 44
Removal Procedure . . . . . 8 - 44
Mounting procedure . . . . . 8 - 44
Rear Panel2 (RP2) Board (FRU No. 502) . . . . . 8 - 45
Tools . . . . . 8 - 45
Needed Manpower . . . . . 8 - 45
Preparations . . . . . 8 - 45
Removal Procedure . . . . . 8 - 45
Mounting procedure . . . . . 8 - 45
Rear Panel Interface (RPI) Board (FRU No. 503) . . . . . 8 - 46
Tools . . . . . 8 - 46
Needed Manpower . . . . . 8 - 46
Preparations . . . . . 8 - 46
Removal Procedure . . . . . 8 - 46
Mounting procedure . . . . . 8 - 46
Front Panel (FRU No. 504) . . . . . 8 - 47
Tools . . . . . 8 - 47
Needed Manpower . . . . . 8 - 47
Preparations . . . . . 8 - 47
Removal Procedure . . . . . 8 - 47
Mounting procedure . . . . . 8 - 47
Rear Panel Fuse (FRU No. 505) . . . . . 8 - 48
Tools . . . . . 8 - 48
Needed Manpower . . . . . 8 - 48
Preparations . . . . . 8 - 48
Removal Procedure . . . . . 8 - 48
Mounting procedure . . . . . 8 - 48

PCB . . . . . 8 - 49
PCB Boards (FRU No. 601 ~ 605, 608, 609) . . . . . 8 - 49

Tools . . . . . 8 - 49
Needed Manpower . . . . . 8 - 49
Preparations . . . . . 8 - 49
Removal Procedure . . . . . 8 - 49
Mounting procedure . . . . . 8 - 49
Connector Board Assy (FRU No. 606) . . . . . 8 - 51
Tools . . . . . 8 - 51
Needed Manpower . . . . . 8 - 51
Preparations . . . . . 8 - 51
Removal Procedure . . . . . 8 - 51
Mounting procedure . . . . . 8 - 51
Card Cage with Back Plane Board (FRU No. 607) . . . . . 8 - 52
Tools . . . . . 8 - 52
Needed Manpower . . . . . 8 - 52
Preparations . . . . . 8 - 52
Removal Procedure . . . . . 8 - 52
Mounting procedure . . . . . 8 - 52
BEP Assy (FRU No. 700) . . . . . 8 - 53
Tools . . . . . 8 - 53
Needed Manpower . . . . . 8 - 53
Preparations . . . . . 8 - 53
Removal Procedure . . . . . 8 - 53
Mounting procedure . . . . . 8 - 53
BEP Assy Cable Identification . . . . . 8 - 54
Hard Disc Drive (FRU no. 701) . . . . . 8 - 55
Tools . . . . . 8 - 55
Needed Manpower . . . . . 8 - 55
Preparations . . . . . 8 - 55
Removal Procedure . . . . . 8 - 55
Mounting Procedure . . . . . 8 - 55
Compact Disc Read Write Drive (FRU no. 702) . . . . . 8 - 57
Tools . . . . . 8 - 57
Needed Manpower . . . . . 8 - 57
Preparations . . . . . 8 - 57
Removal Procedure . . . . . 8 - 57
Mounting Procedure . . . . . 8 - 57
BEP Power Supply (FRU no. 703) . . . . . 8 - 59
Tools . . . . . 8 - 59
Needed Manpower . . . . . 8 - 59
Preparations . . . . . 8 - 59
Removal Procedure . . . . . 8 - 59
Mounting Procedure . . . . . 8 - 59
PCVIC PCB (FRU no. 704) . . . . . 8 - 61
Tools . . . . . 8 - 61
Needed Manpower . . . . . 8 - 61
Preparations . . . . . 8 - 61

Removal Procedure . . . . . 8 - 61
Mounting Procedure . . . . . 8 - 61
PC2IP PCB (FRU no. 706) . . . . . 8 - 63
Tools . . . . . 8 - 63
Needed Manpower . . . . . 8 - 63
Preparations . . . . . 8 - 63
Removal Procedure . . . . . 8 - 63
Mounting Procedure . . . . . 8 - 63

Power Block . . . . . 8 - 65
Transformer Assy (FRU No. 800) . . . . . 8 - 65
Tools . . . . . 8 - 65
Needed Manpower . . . . . 8 - 65
Preparations . . . . . 8 - 65
Removal Procedure . . . . . 8 - 65
Mounting procedure . . . . . 8 - 65
LVPS Disassy (FRU No. 801) . . . . . 8 - 67
Tools . . . . . 8 - 67
Needed Manpower . . . . . 8 - 67
Preparations . . . . . 8 - 67
Removal Procedure . . . . . 8 - 67
Mounting procedure . . . . . 8 - 67
AC Interface Board (ACI) (FRU No. 802) . . . . . 8 - 68
Tools . . . . . 8 - 68
Needed Manpower . . . . . 8 - 68
Preparations . . . . . 8 - 68
Removal Procedure . . . . . 8 - 68
Mounting procedure . . . . . 8 - 68
Fuse (FRU No. 803) . . . . . 8 - 69
Tools . . . . . 8 - 69
Needed Manpower . . . . . 8 - 69
Preparations . . . . . 8 - 69
Removal Procedure . . . . . 8 - 69
Mounting procedure . . . . . 8 - 69
Circuit Breaker (FRU No. 804) . . . . . 8 - 70
Tools . . . . . 8 - 70
Needed Manpower . . . . . 8 - 70
Preparations . . . . . 8 - 70
Removal Procedure . . . . . 8 - 70
Mounting procedure . . . . . 8 - 70
Noise Filter(FRU No. 805) . . . . . 8 - 71
Tools . . . . . 8 - 71
Needed Manpower . . . . . 8 - 71
Preparations . . . . . 8 - 71
Removal Procedure . . . . . 8 - 71
Mounting procedure . . . . . 8 - 71

Software Loading Procedure . . . . . 8 - 72
Installing Base System Software and Application Software . . . . . 8 - 72
General . . . . . 8 - 72
Saving the Data (Using Utility Function) . . . . . 8 - 73

Base Load Software Load . . . . . 8 - 76
Manpower . . . . . 8 - 76
Tools . . . . . 8 - 76
Preparations . . . . . 8 - 76
Base Load Software Load Procedure . . . . . 8 - 76
Optional Manual Drive Remapping . . . . . 8 - 78
Optional Manual Configurations . . . . . 8 - 78
Loading Applications Software . . . . . 8 - 78
Final System Setup . . . . . 8 - 78
serialno.txt File Creation . . . . . 8 - 79
Optional Check Devices . . . . . 8 - 80
Optional Procedure for Changing (Re-mapping) Drive Letters . . . . . 8 - 82

Loading Application Software After a Base Image Load . . . . . 8 - 87
Manpower . . . . . 8 - 87
Tools . . . . . 8 - 87
Preparations . . . . . 8 - 87
Image Management Guide . . . . . 8 - 87
Save As (Saving Images to CD-ROM to View on Any PC) . . . . . 8 - 87
Moving Images (Image Archive) . . . . . 8 - 89
Export/Import (Moving Data Between Ultrasound Systems) . . . . . 8 - 91
Importing Data . . . . . 8 - 93
Loading Applications Software . . . . . 8 - 93
Possible Behavior of the First Power Up After Application Load . . . . . 8 - 96
GE USB Control Panel Driver Loss . . . . . 8 - 96

Upgrading Application Software . . . . . 8 - 100
Manpower . . . . . 8 - 100
Tools . . . . . 8 - 100
Preparations . . . . . 8 - 100
Applications Software Upgrade Procedure . . . . . 8 - 100
Possible Behavior of the First Power Up After Application Load . . . . . 8 - 103
GE USB Control Panel Driver Loss . . . . . 8 - 103
.System Setup . . . . . 8 - 106
Restore Patient, Report, and User-Defined Presets . . . . . 8 - 106
Functional Checks for Service Platform (Diagnostic Program) . . . . 8 - 107
Restoring the Data . . . . . 8 - 110
Functional Checks for Probe Recognition . . . . . 8 - 112

. . . . . .
Installing Option Software . . . . . 8 - 113
Preparations . . . . . 8 - 113
Procedures . . . . . 8 - 113

CHAPTER 9

Overview . . . . . 9 - 1
Purpose of Chapter 9 . . . . . 9 - 1
List of Abbreviations . . . . . 9 - 2
Operator Console Assy . . . . . 9 - 3
Monitor . . . . . 9 - 5
Keyboard . . . . . 9 - 6
External Covers . . . . . 9 - 8
Mechanical Assembly's . . . . . 9 - 10
I/O Interfaces . . . . . 9 - 11
PCB Boards . . . . . 9 - 12
BEP . . . . . 9 - 14
Power Block . . . . . 9 - 16
Power Cord . . . . . 9 - 17
Probes . . . . . 9 - 17
Peripherals . . . . . 9 - 18
Cables Set . . . . . 9 - 18
Option Parts . . . . . 9 - 19

CHAPTER 10

Overview . . . . . 10 - 1
Periodic Maintenance Inspection . . . . . 10 - 1
Purpose of Chapter 10 . . . . . 10 - 1

Why do Maintenance . . . . . 10 - 2
Keeping Records . . . . . 10 - 2
.Quality Assurance . . . . . 10 - 2

Periodic Maintenance Schedule . . . . . 10 - 2
How often should care & maintenance tasks be performed? . . . . . 10 - 2

Tools Required. . . . . 10 - 4
Standard GE Tool Kit . . . . . 10 - 4
Special Tools, Supplies and Equipment . . . . . 10 - 6
Specific Requirements for Care & Maintenance . . . . . 10 - 6

System Maintenance . . . . . 10 - 7
Preliminary Checks . . . . . 10 - 7
Functional Checks (See Also Chapter 4) . . . . . 10 - 8
System Checks . . . . . 10 - 8
Peripheral/Option Checks . . . . . 10 - 9
Input Power . . . . . 10 - 9
Mains Cable Inspection . . . . . 10 - 9
Cleaning . . . . . 10 - 9
General Cleaning . . . . . 10 - 9
Air Filter Cleaning . . . . . 10 - 10
Physical Inspection . . . . . 10 - 10
Optional Diagnostic Checks . . . . . 10 - 11
View the Logs . . . . . 10 - 11
Probe Maintenance . . . . . 10 - 11
Probe Related Checks . . . . . 10 - 11
Basic Probe Care . . . . . 10 - 11
Basic Probe Cleaning . . . . . 10 - 11

Using a Phantom . . . . . 10 - 12

Electrical Safety Tests . . . . . 10 - 12
Safety Test Overview . . . . . 10 - 12
GEMS Leakage Current Limits . . . . . 10 - 13
Outlet Test - Wiring Arrangement - USA & Canada . . . . . 10 - 14
Grounding Continuity . . . . . 10 - 15
Meter Procedure . . . . . 10 - 15

Dale 600 - Ground Continuity . . . . . 10 - 16
Chassis Leakage Current Test . . . . . 10 - 17
Definition . . . . . 10 - 17
Generic Procedure . . . . . 10 - 17
Dale 600 Meter Procedure . . . . . 10 - 18
Data Sheet for Chassis Source Leakage Current . . . . . 10 - 19
Isolated Patient Lead (Source) Leakage–Lead to Ground . . . . . 10 - 19
Definition . . . . . 10 - 19
Generic Procedure . . . . . 10 - 20
Dale 600 Meter Procedure . . . . . 10 - 20
Isolated Patient Lead (Source) Leakage–Lead to Lead . . . . . 10 - 22
Dale 600 Patient Lead Tests . . . . . 10 - 22
Isolated Patient Lead (Sink) Leakage-Isolation Test . . . . . 10 - 22
Data Sheet for ECG Leakage Current . . . . . 10 - 23
Probe Leakage Current Test . . . . . 10 - 24
Definition . . . . . 10 - 24
Generic Procedure . . . . . 10 - 24
Meter Procedure Using Probe Adapter . . . . . 10 - 24
No Meter Probe Adapter Procedure . . . . . 10 - 26
Data Sheet for Transducer Source Leakage Current . . . . . 10 - 27

When There's Too Much Leakage Current... . . . . 10 - 28

Chapter 1
Introduction

Section 1-1
Overview

1-1-1 Purpose of Chapter 1

This chapter describes important issues related to safely servicing the LOGIQ™ 3 scanner. The service provider must read and understand all the information presented in this manual before installing or servicing a unit.

1-1-2 Chapter Contents

Table 1-1 Contents in Chapter 1

Section	Description	Page Number
1-1	Overview	1-1
1-2	Safety	1-3
1-3	Important Conventions	1-4
1-4	Safety Considerations	1-8
1-5	EMC, EMI, and ESD	1-15
1-6	Customer Assistance	1-16

1-1-3 Purpose of Service Manual

This Service Manual provides installation and service information for the LOGIQ™ 3 Ultrasound Scanning System and contains the following chapters:

1.) **Chapter 1 - Introduction** Contains a content summary and warnings.
2.) **Chapter 2 - Pre-Installation** Contains pre-installation requirements for the LOGIQ™ 3.
3.) **Chapter 3 - Installation** Contains installation procedure with installation checklist.
4.) **Chapter 4 - Functional Checks** Contains functional checks that must be performed as part of the installation, or as required during servicing and periodic maintenance.
5.) **Chapter 5 - Components and Functions (Theory)** Contains block diagrams and functional explanations of the electronics.
6.) **Chapter 6 - Service Adjustments** Contains instructions on how to make available adjustments to the LOGIQ™ 3.
7.) **Chapter 7 - Diagnostics/Troubleshooting** Provides procedures for running diagnostic or related routines for the LOGIQ™ 3.
8.) **Chapter 8 - Replacement Procedures** Provides disassembly procedures and reassembly procedures for all changeable Field Replaceable Units (FRU).
9.) **Chapter 9 - Renewal Parts** Contains a complete list of replacement parts for the LOGIQ™ 3.
10.) **Chapter 10 - Care & Maintenance** Provides periodic maintenance procedures for the LOGIQ™ 3.

1-1-4 Typical Users of the Basic Service Manual

- Service Personnel (installation, maintenance, etc.).
- Hospital's Service Personnel
- Contractors (Some parts of Chapter 2 - Pre-Installation)

1-1-5 LOGIQ™ 3 Models Covered by this Manual

l

Table 1-2 LOGIQ™ 3 Model Designations

H-Cat Number	Part Number	Description
H41702LA	2327746	LOGIQ™ 3 Console and Peripherals for Korea, Chile - NTSC
H41702LB	2327748	LOGIQ™ 3 Console and Peripherals for Japan - NTSC
H41702LH	2327754	LOGIQ™ 3 Console and Peripherals for USA - NTSC
H41702LF	2327752	LOGIQ™ 3 Console and Peripherals for Europe - PAL
H41702LD	2327750	LOGIQ™ 3 Console and Peripherals for India - PAL
H41702LC	2327749	LOGIQ™ 3 Console and Peripherals for China - PAL

1-1-6 Purpose of Operator Manual(s)

The Operator Manual(s) should be fully read and understood before operating the LOGIQ™ 3 and also kept near the unit for quick reference.

Section 1-2
Safety

1-2-1 Warnings

WARNING ***CAREFULLY READ ALL OF THE WARNINGS BELOW***

1.) The operator manual should be fully read and understood before operating the LOGIQ™ 3 and kept nearby for quick reference.

2.) Although the ultrasound energy transmitted from the LOGIQ™ 3 transducer is within AIUM/NEMA standards, unnecessary exposure should be avoided. Only trained personnel should operate the LOGIQ™ 3.

3.) To prevent electrical shock, the LOGIQ™ 3 should be connected to a properly grounded power receptacle. Do not use a three prong to two prong adapter. This defeats safety grounding.

4.) Probes are fragile, please handle with care.

5.) Concerning Outside Markings, refer to Figure 1-2 through 1-3.

6.) For the cleaning, disinfection, and sterilization, refer to Probe section in LOGIQ™ 3 User Manual and Caution Sheet supplied with each probe.

NOTICE This medical equipment is approved, in terms of the prevention of radio wave interference, to be used in hospitals, clinics and other institutions which are environmentally qualified. The use of this equipment in an inappropriate environment may cause some electronic interference to radios and televisions around the equipment. Proper handling of this equipment is required in order to avoid such trouble according to the operator and service manuals.This equipment can be used in residential areas only under the supervision of physicians or qualified technicians.

CAUTION **Improper performance possibility. Do not use the following devices near this equipment. Cellular phone, radio transceiver, mobile radio transmitter, radio-controlled toy, etc. Use of these devices near this equipment could cause this equipment to perform outside the published specifications. Keep power to these devices turned off when near this equipment**

Section 1-3
Important Conventions

1-3-1 Conventions Used in Book

Icons

Pictures, or icons, are used wherever they reinforce the printed message. The icons, labels and conventions used on the product and in the service information are described in this chapter.

Safety Precaution Messages

Various levels of safety precaution messages may be found on the equipment and in the service information. The different levels of concern are identified by a flag word that precedes the precautionary message. Known or potential hazards are labeled in one of following ways:

DANGER **DANGER IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT WILL CAUSE SEVERE PERSONAL INJURY OR DEATH IF THE INSTRUCTIONS ARE IGNORED.**

WARNING ***WARNING IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT CAN CAUSE SEVERE PERSONAL INJURY OR PROPERTY DAMAGE IF INSTRUCTIONS ARE IGNORED.***

CAUTION **Caution is used to indicate the presence of a hazard that will or can cause minor personal injury and property damage if instructions are ignored.**

NOTICE **Equipment Damage Possible**
Notice is used when a hazard is present that can cause property damage but has absolutely no personal injury risk.
Example: Disk Drive will crash.

NOTE: Notes provide important information about an item or a procedure.
Information contained in a NOTE can often save you time or effort.

1-3-2 Standard Hazard Icons

Important information will always be preceded by the exclamation point contained within a triangle ⚠, as seen throughout this chapter. In addition to text, several different graphical icons (symbols) may be used to make you aware of specific types of hazards that could cause harm.

Table 1-3 Standard Hazard Icons

ELECTRICAL	MECHANICAL	RADIATION
LASER	**HEAT**	**PINCH**

Other hazard icons make you aware of specific procedures that should be followed.

Table 1-4 Standard Icons Indicating a Special Procedure Be Used

AVOID STATIC ELECTRICITY	TAG AND LOCK OUT	WEAR EYE PROTECTION

1-3-3 Product Icons

The following table describes the purpose and location of safety labels and other important information provided on the equipment.

Table 1-5 Product Icons

LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
Identification and Rating Plate	Manufacturer's name and address Date of manufacture Model and serial numbers Electrical ratings	Rear of console near power inlet On each probe
Device Listing/Certification Labels	Laboratory logo or labels denoting conformance with industry safety standards such as UL or IEC.	Rear of console
Type/Class Label	Used to indicate the degree of safety or protection	
IP Code (IP68)	Indicates the degree of protection provided by the enclosure per IEC 60529. IP68 indicates can be used in operating room environment.	Footswitch
	Equipment Type BF (man in the box symbol) IEC 60878 indicates B Type equipment having a floating applied part	Probe connectors and PCG Connectors
	Equipment Type CF (heart in the box symbol) IEC 60878 indicates equipment having a floating applied part having a high degree of protection suitable for direct cardiac contact.	ECG connector and Probes marked Type CF
"CAUTION This unit weighs... Special care must be used to avoid..." 	This precaution is intended to prevent injury that may result if one person attempt to move the unit considerable distances or on an incline due to the weight of the unit.	On the console where easily seen during transport
	"CAUTION" The equilateral triangle is usually used in combination with other symbols to advise or warn the user.	Various
	ATTENTION - Consult accompanying documents " is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.	Various
	"CAUTION - Dangerous voltage" (the lightning flash with arrowhead in equilateral triangle) is used to indicate electric shock hazards.	Various

Table 1-5 Product Icons (Continued)

LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	"Mains OFF" Indicates the power off position of the mains power switch.	Rear of system adjacent to mains switch
	"OFF/Standby" Indicates the power off/standby position of the power switch. **CAUTION** **This Power Switch DOES NOT ISOLATE Mains Supply**	Adjacent to On-Off/Standby Switch
	"Mains ON" Indicates the power on position of the mains power switch. **CAUTION** **This Power Switch DOES NOT ISOLATE Mains Supply**	Rear of system adjacent to mains switch
	"Protective Earth" Indicates the protective earth (grounding) terminal.	Internal
	Type CF Defib-Proof Applied Part (heart in the box with paddle) symbol is in accordance with IEC 878-02-03	ECG Module
	Alternating Current	Rear Panel, Circuit breaker label of Console and Front Panel
	"Non-Ionizing Radiation" indicates that the system applies RF energy.	Rear of console
	Do not use the following devices near this equipment, Cellular phones, radio transceivers, mobile radio transmitters, radio controlled toy etc. Use of these devices could cause this equipment to perform outside the published specifications. Keep power to these devices turned off when near this equipment.	Rear of console

Section 1-4
Safety Considerations

1-4-1 Introduction

The following safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual, violates safety standards of design, manufacture and intended use of the equipment.

1-4-2 Human Safety

Operating personnel must not remove the system covers.
Servicing should be performed by authorized personnel only.
Only personnel who have participated in a LOGIQ™ 3 Training Seminar are authorized to service the equipment.

1-4-3 Mechanical Safety

WARNING ***WHEN THE UNIT IS RAISED FOR A REPAIR OR MOVED ALONG ANY INCLINE, USE EXTREME CAUTION SINCE IT MAY BECOME UNSTABLE AND TIP OVER.***

WARNING ***ULTRASOUND PROBES ARE HIGHLY SENSITIVE MEDICAL INSTRUMENTS THAT CAN EASILY BE DAMAGED BY IMPROPER HANDLING. USE CARE WHEN HANDLING AND PROTECT FROM DAMAGE WHEN NOT IN USE. DO NOT USE A DAMAGED OR DEFECTIVE PROBE. FAILURE TO FOLLOW THESE PRECAUTIONS CAN RESULT IN SERIOUS INJURY AND EQUIPMENT DAMAGE.***

WARNING ***NEVER USE A PROBE THAT HAS FALLEN TO THE FLOOR. EVEN IF IT LOOKS OK, IT MAY BE DAMAGED.***

CAUTION **Always lock the Control Console in its parking (locked) position before moving the scanner around.**

CAUTION **The LOGIQ™ 3 weights approx 155kg (342lbs), depending on installed peripherals, when ready for use. Care must be used when moving it or replacing its parts. Failure to follow the precautions listed below could result in injury, uncontrolled motion and costly damage.**

ALWAYS:

- **Be sure the path way is clear.**
- **Use slow, careful motions.**
- **Use two people when moving on inclines or lifting more than 23 kg (50 lb.).**

NOTE: Special care should be taken when transporting the unit in a vehicle:

- *Secure the unit in an upright position.*
- *Lock the wheels (brake)*
- *DO NOT use the Control Panel as an anchor point.*
- *Place the probes in their carrying case.*
- *Eject any CD (R/W) disk from the CD(R/W) Drive*
- Remove the Footswitch and place it in a secure place
- Disconnect any other Off board peripherals if used.

NOTE: Keep the Heat venting holes on the monitor unobstructed to avoid overheating of the monitor.

1-4-4 Electrical Safety

To minimize shock hazard, the equipment chassis must be connected to an electrical ground. The system is equipped with a three-conductor AC power cable. This must be plugged into an approved electrical outlet with safety ground. If an extension cord is used with the system, make sure that the total current rating of the extension cord is greater than the system rating.

The power outlet used for this equipment should not be shared with other types of equipment.

Both the system power cable and the power connector meet international electrical standards.

CAUTION **If the Power Plug is Modified or replaced to Suit the local Conditions and regulations, Ground continuity check should be performed between Ground Pin on the Plug and a Metal Part on the LOGIQ™ 3. Refer Section 10-7-4 for more details.**

1-4-5 Returning/Shipping Probes and Repair Parts

Equipment being returned must be clean and free of blood and other infectious substances.

GEMS policy states that body fluids must be properly removed from any part or equipment prior to shipment. GEMS employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstance should a part or equipment with visible body fluids be taken or shipped from a clinic or site (for example, body coils or an ultrasound probe).

The purpose of the regulation is to protect employees in the transportation industry, as well as the people who will receive or open this package.

NOTE: The US Department of Transportation (DOT) has ruled that "items that were saturated and/or dripping with human blood that are now caked with dried blood; or which were used or intended for use in patient care" are "regulated medical waste" for transportation purposes and must be transported as a hazardous material.

1-4-6 Labels Locations

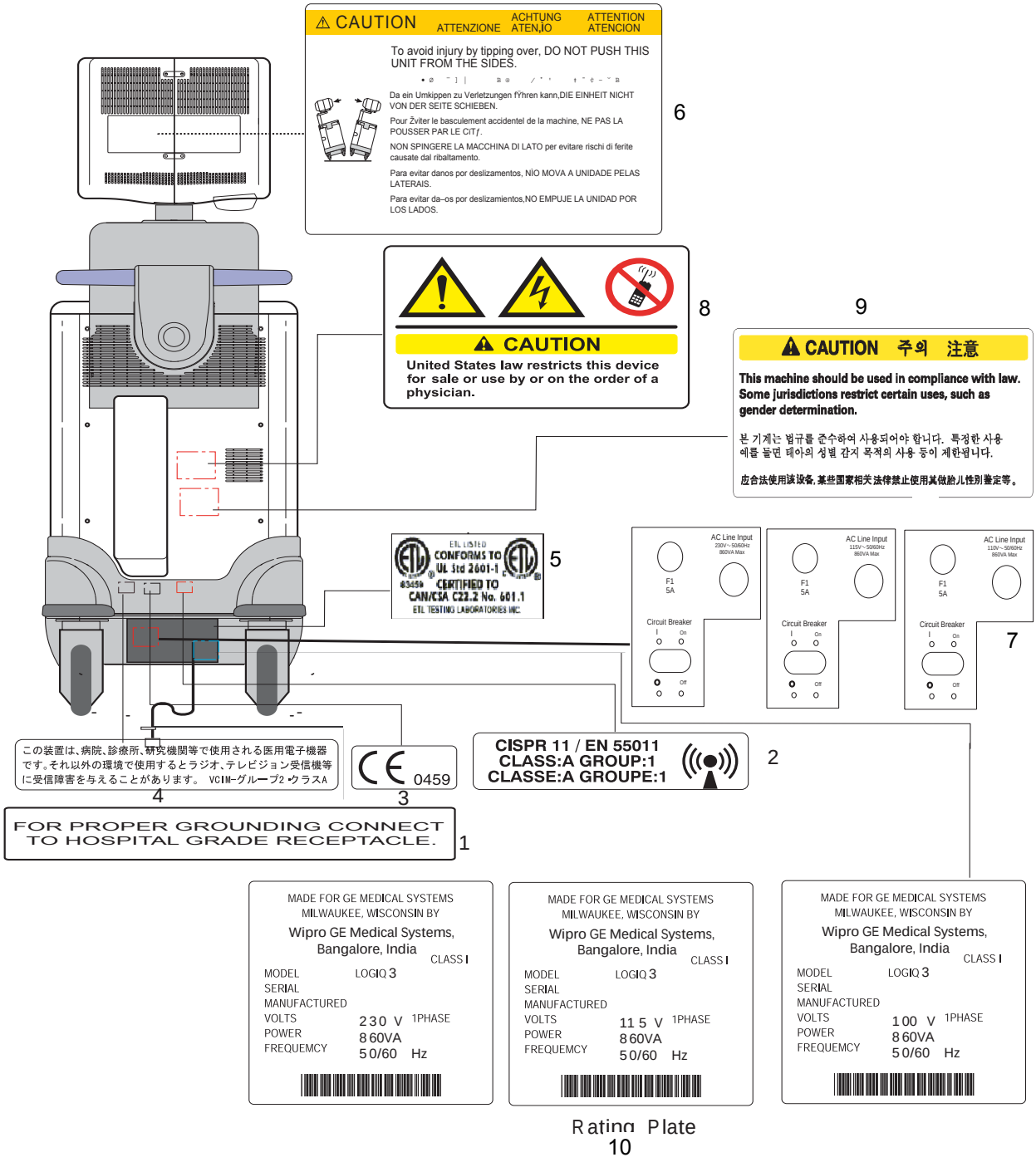

⚠ CAUTION ATTENZIONE ACHTUNG ATEN,IO ATTENTION ATENCION
To avoid injury by tipping over, DO NOT PUSH THIS UNIT FROM THE SIDES.
Da ein Umkippen zu Verletzungen fÝhren kann,DIE EINHEIT NICHT VON DER SEITE SCHIEBEN.
Pour Žviter le basculement accidentel de la machine, NE PAS LA POUSSER PAR LE CIT ƒ.
NON SPINGERE LA MACCHINA DI LATO per evitare rischi di ferite causate dal ribaltamento.
Para evitar danos por deslizamentos, NÍO MOVA A UNIDADE PELAS LATERAIS.
Para evitar da–os por deslizamientos,NO EMPUJE LA UNIDAD POR LOS LADOS.
6
⚠ CAUTION
United States law restricts this device for sale or use by or on the order of a physician.
8
9
⚠ CAUTION 주의 注意
This machine should be used in compliance with law. Some jurisdictions restrict certain uses, such as gender determination.
본 기계는 법규를 준수하여 사용되어야 합니다. 특정한 사용에를 들면 테아의 성별 감지 목적의 사용 등이 제한됩니다.
应合法使用该设备,某些国家相关法律禁止使用其做胎儿性别鉴定等。
ETL LISTED CONFORMS TO UL Std 2601-1 CERTIFIED TO CAN/CSA C22.2 No. 601.1 ETL TESTING LABORATORIES INC.
5
AC Line Input
F1 5A
Circuit Breaker
7
この装置は、病院、診療所、研究機関等で使用される医用電子機器です。それ以外の環境で使用するとラジオ、テレビジョン受信機等に受信障害を与えることがあります。 VCIM-グループ2 -クラスA
4
CE 0459
3
CISPR 11 / EN 55011
CLASS:A GROUP:1
CLASSE:A GROUPE:1
2
FOR PROPER GROUNDING CONNECT TO HOSPITAL GRADE RECEPTACLE.
1
MADE FOR GE MEDICAL SYSTEMS
MILWAUKEE, WISCONSIN BY
Wipro GE Medical Systems, Bangalore, India
CLASS I
MODEL LOGIQ 3
SERIAL
MANUFACTURED
VOLTS 230 V 1PHASE
POWER 860VA
FREQUEMCY 50/60 Hz
MADE FOR GE MEDICAL SYSTEMS
MILWAUKEE, WISCONSIN BY
Wipro GE Medical Systems, Bangalore, India
CLASS I
MODEL LOGIQ 3
SERIAL
MANUFACTURED
VOLTS 115 V 1PHASE
POWER 860VA
FREQUEMCY 50/60 Hz
MADE FOR GE MEDICAL SYSTEMS
MILWAUKEE, WISCONSIN BY
Wipro GE Medical Systems, Bangalore, India
CLASS I
MODEL LOGIQ 3
SERIAL
MANUFACTURED
VOLTS 100 V 1PHASE
POWER 860VA
FREQUEMCY 50/60 Hz
Rating Plate
10

Figure 1-1 Label Location

1-4-6 Labels Locations (contd.)

Location

1.) Grounding reliability Label
2.) CISPR Label
3.) CE Mark Label
4.) EIAJ Label
5.) ETL Label
6.) Tipping Caution Label
7.) Power Indication Label
8.) Prescription Device for US Only
9.) Gender Determination Label for Asia only
10.) Identification and Rating Plate

1-4-6 Label Locations (Cont'd).

NOTE: For an explanation of the symbols shown in the illustration, refer to latter pages in this chapter.

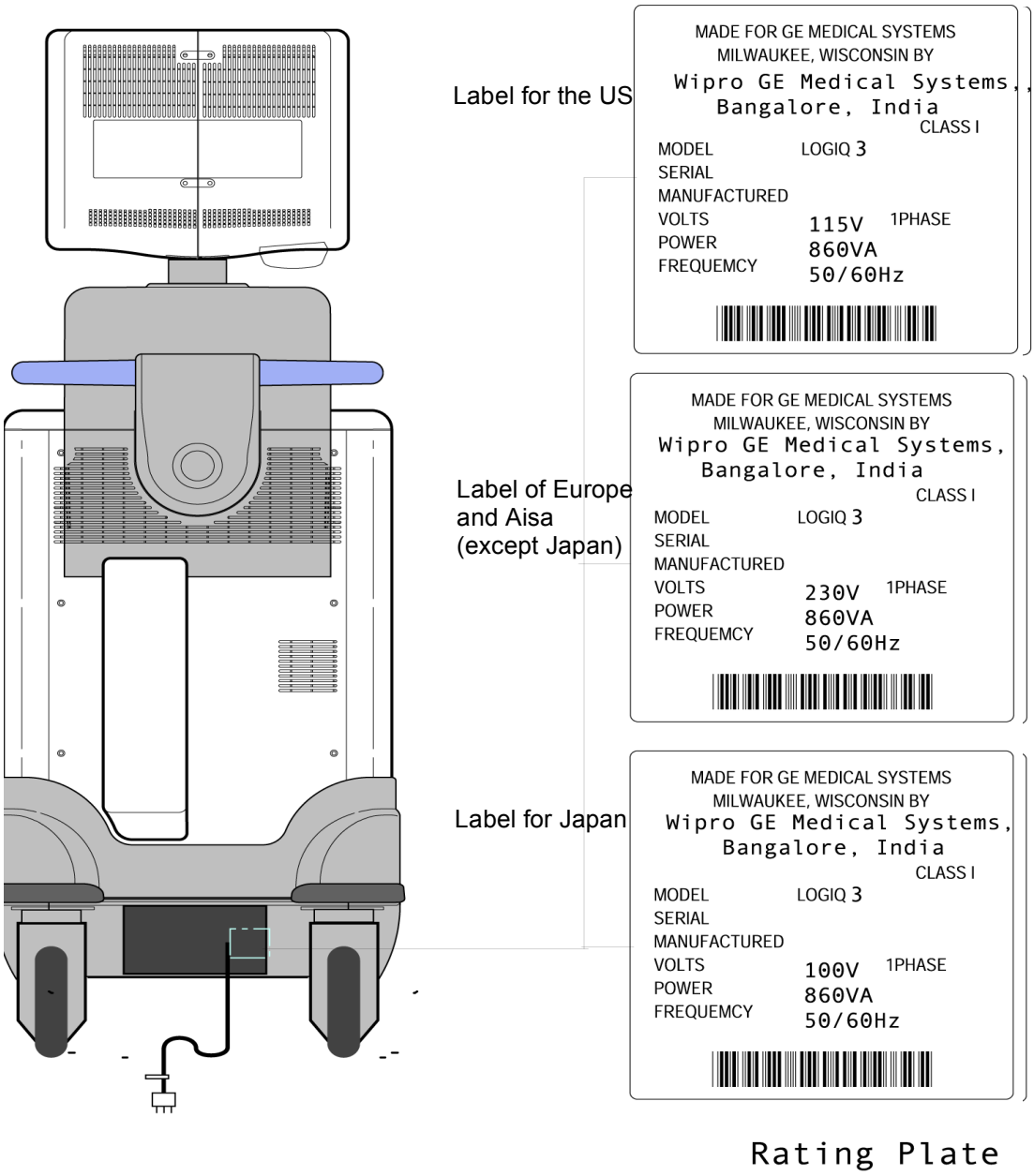


Figure 1-2 OUTSIDE MARKINGS OF LOGIQ™ 3

NOTE: For an explanation of the symbols shown in the illustration, refer to latter pages in this chapter.
The CAUTION label for the radio influence is required to be attached on the console from April, 1996.
The GOST label is required to be attached on the console from June, 1998.
The Sex determination label is required to be attached on the console from September 2001, for Asia Only

NOTE: The labels shown in the Figure 1-2 are supplied with the consoles for Europe. They shall be attached on the console over the existing labels as necessary. Refer to the installation instructions supplied with the labels.

1-4-6 Label Locations (Cont'd).

Labels at Front Panel

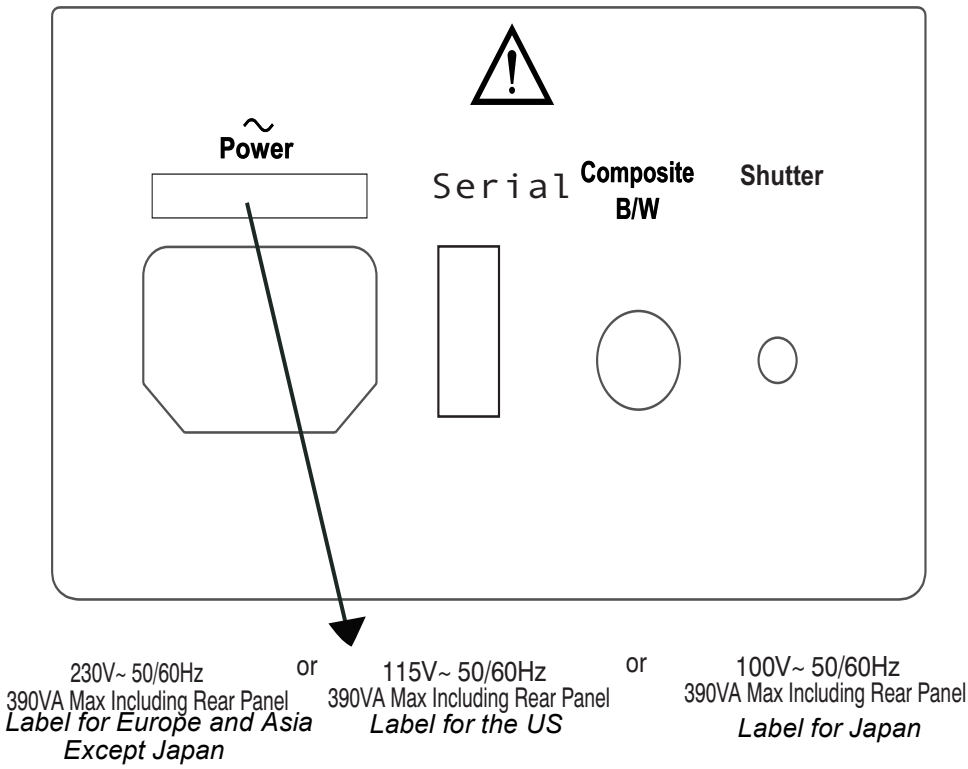


Figure 1-3 OUTSIDE MARKINGS OF LOGIQ™ 3

1-4-7 Dangerous Procedure Warnings

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

DANGER

DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.

WARNING

EXPLOSION WARNING: DO NOT OPERATE THE EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE. OPERATION OF ANY ELECTRICAL EQUIPMENT IN SUCH AN ENVIRONMENT CONSTITUTES A DEFINITE SAFETY HAZARD.

WARNING

DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT: BECAUSE OF THE DANGER OF INTERDICTING ADDITIONAL HAZARDS, DO NOT INSTALL SUBSTITUTE PARTS OR PERFORM ANY UNAUTHORIZED MODIFICATION OF THE EQUIPMENT.

1-4-8 Lockout/Tagout Requirements (For USA / Europe Only)

Follow OSHA Lockout/Tagout requirements by ensuring you are in total control of the plug.

Section 1-5
EMC, EMI, and ESD

1-5-1 Electromagnetic Compatibility

Electro Magnetic Compatibility describes a level of performance of a device within its electromagnetic environment. This environment consists of the device itself and its surroundings including other equipment, power sources and persons with which the device must interface. Inadequate compatibility results when a susceptible device fails to perform as intended due interface from its environment or when the device produces unacceptable levels of emission to its environment. This interference is often referred to as radio-frequency or electromagnetic interface (RFI/EMI) and can be radiated through space or conducted over interconnecting power of signal cables. In addition to electromagnetic energy, EMC also includes possible effects from electrical fields, magnetic fields, electrostatic discharge and disturbances in the electrical power supply.

1-5-2 Electrostatic Discharge (ESD) Prevention

DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS:

WARNING

1.) Always connect yourself, via an arm-wrist strap, to the advised ESD connection point located on the rear of the scanner (to the right of the power connector).

2.) Follow general guide lined for handling of electrostatic sensitive equipment.

1-5-3 CE Compliance

The LOGIQ™ 3 unit conforms to all applicable conducted and radiated emission limits and immunity from electrostatic discharge, radiated and conducted RF fields, magnetic fields and power line transient requirements.

Applicable standards are: 47CFR Part18, IEC/EN 60601-1-2

NOTE: For CE Compliance, it is critical that all covers, screws, shielding, gaskets, mesh, clamps, are in good condition, installed tightly without skew or stress. Proper installation following all comments noted in this service manual is required in order to achieve full EMC performance.

Section 1-6
Customer Assistance

1-6-1 Contact Information

If this equipment does not work as indicated in this service manual or in the User Manual, or if you require additional assistance, please contact the local distributor or appropriate support resource, as listed below.

- Prepare the following information before you call:
- System ID serial number.
- Software version.

For GE Service:

Table 1-6 GE Service

Location	Phone Number
USA/ Canada GE Medical Systems Ultrasound Service Engineering 4855 W. Electric Avenue Milwaukee, WI 53219 Customer Answer Center	1-800-437-1171 1-800-682-5327 1-262-524-5698 Fax: +1-414-647-4125
Latin America GE Medical Systems Ultrasound Service Engineering 4855 W. Electric Avenue Milwaukee, WI 53219 Customer Answer Center	1-262-524-5300 1-262-524-5698 Fax: +1-414-647-4125
Asia (Singapore/ Japan) GE Ultrasound Asia Service Department - Ultrasound 298 Tiong Bahru Road #15-01/06 Central Plaza Singapore 169730	Tel: +65 291-8528 +81 426-482950 Fax: +65 272-3997 +81 426-482902
Europe GE Ultraschall Deutschland GmbH& Co. KG BeethovenstraBe 239 Postfach 11 05 60, D-42665 Solingen Germany	Tel: +49 212 2802 208 +49 212 2802 207 Fax: +49 212 2802 431

1-6-2 System Manufacturer

Table 1-7 System Manufacturer

WIPRO GE MEDICAL SYSTEMS - INDIA
WIPRO GE MEDICAL SYSTEMS Ultrasound Group PLOT # 4, KADUGODI INDUSTRIAL AREA, SADARAMANGALA, BANGALORE 560067, INDIA. TEL: (91) 80-2845-2923 FAX: (91) 80-2845-2924

This page was intentionally left blank.

Chapter 2
Pre-Installation

Section 2-1
Overview

2-1-1 Purpose of Chapter 2

This chapter provides the information required to plan and prepare for the installation of a LOGIQ™ 3. Included are descriptions of the facility and electrical needs to be met by the purchaser of the unit.

2-1-2 Chapter Contents

Table 2-1 Contents in Chapter 2

Section	Description	Page Number
2-1	Overview	2-1
2-2	General Console Requirements	2-2
2-3	Facility Needs	2-7

Section 2-2
General Console Requirements

2-2-1 Console Environmental Requirements

2-2-2

Table 2-2 Environmental Requirements for LOGIQ™ 3 Scanners

	Operation	Storage	Transport
Temperature	10 - 40 degree C 50 - 104 degree F	-10 - 60 degree C 14 - 140 degree F	-40 - 60 degree C -40 - 140 degree F
Humidity	30 - 85% non-condensing	30 - 90% non-condensing	30 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

Table 2-3 Environmental Requirements for an Ultrasound Room

Item	Values
Power Source	Refer to Table 2-4 on page 2-3.
Current Rating	10A (100V); 8.5A(115V); 5A(230V)
Radiation Shielding	NONE REQUIRED for ULTRASOUND ENERGY
Temperature	20-26 DEG. C (68-79 DEG F) for PATIENT COMFORT
Humidity	50% to 70% for PATIENT COMFORT
Heat Dissipation	1366 BTU/Hr.
Floor Landing	Approximately 680 - 800 kg/m^2 without Accessories
Floor Condition	Gradient: WITHIN 5 degrees
Weight	155 kg (342lbs) without Accessories

2-2-2-1 Cooling

The cooling requirement for the LOGIQ™ 3 is 1366 BTU/hr. This figure does not include cooling needed for lights, people, or other equipment in the room. Each person in the room places an additional 300 BTU/hr. demand on the cooling system.

2-2-2-2 Lighting

Bright light is needed for system installation, updates and repairs. However, operator and patient comfort may be optimized if the room light is subdued and indirect. Therefore a combination lighting system (dim/bright) is recommended. Keep in mind that lighting controls and dimmers can be a source of EMI which could degrade image quality. These controls should be selected to minimize possible interference.

2-2-3 Electrical Requirements

NOTE: GE Medical Systems requires a dedicated power and ground for the proper operation of its Ultrasound equipment. This dedicated power shall originate at the last distribution panel before the system.

Sites with a mains power system with defined Neutral and Live:

The dedicated line shall consist of one phase, a neutral (not shared with any other circuit), and a full size ground wire (not shared with any other circuit) from the distribution panel to the Ultrasound outlet.

Sites with a mains power system without a defined Neutral:

The dedicated line shall consist of one phase (two lines), not shared with any other circuit, and a full size ground wire (not shared with any other circuit) from the distribution panel to the Ultrasound outlet.

NOTE: Please note that image artifacts can occur, if at any time within the facility, the ground from the main facility's incoming power source to the Ultrasound unit is only a conduit.

2-2-4 Power Requirements

Electrical Specifications for LOGIQ™ 3.

Table 2-4 Electrical Specifications for LOGIQ™ 3

PARAMETER	AREA	LIMITS
Voltage Range	100V	100 VAC ± 10% (90-110 VAC)
	230V	230 VAC ±10% (207-253 VAC)
	115V	115 VAC ±10% (103-127 VAC)
Power	All applications	MAX. 860VA
Line Frequency	All applications	50/60Hz (±2Hz)
Power Transients	All applications	Less than 25% of nominal peak voltage for less than 1 millisecond for any type of transient, including line frequency, synchronous, asynchronous, or aperiodic transients.
Decaying Oscillation	All applications	Less than 15% of peak voltage for less than 1 millisecond.

2-2-4-1 Inrush Current

Inrush current is not a factor to consider due to inrush current limiting properties of the power supplies.

2-2-4-2 Site Circuit Breaker

It is recommended that the branch circuit breaker for the machine be ready accessible.

DANGER

POWER OUTAGE MAY OCCUR.

The LOGIQ™ 3 requires a dedicated single branch circuit. To avoid circuit overload and possible loss of critical care equipment, make sure you DO NOT have any other equipment operating on the same circuit.

2-2-4-3 Site Power Outlets

A dedicated AC power outlet must be within reach of the unit without extension cords. Other outlets adequate for the external peripherals, medical and test equipment needed to support this unit must also be present within 1 m (3.2 ft.) of the unit. Electrical installation must meet all current local, state, and national electrical codes.

2-2-4-4 Unit Power Plug

If the unit arrives without the power plug, or with the wrong plug, you must contact your GE dealer or the installation engineer must supply what is locally required.

2-2-4-5 Power Stability Requirements

Voltage drop-out / Max 10 ms.

Power Transients

Refer table 2-4

2-2-5 EMI Limitations

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air or wiring. Ultrasound machines also generate EMI. The LOGIQ™ 3 complies with limits as stated on the EMC label. However, there is no guarantee that interference will not occur in a particular installation.

Possible EMI sources should be identified before the unit is installed.

Electrical and electronic equipment may produce EMI unintentionally as the result of a defect. These sources include:

- medical lasers,
- scanners,
- cauterizing guns,
- computers,
- monitors,
- fans,
- gel warmers,
- microwave ovens,
- light dimmers
- portable phones.
- Lift

The presence of a broadcast station or broadcast van may also cause interference.

See Table 2-5 for EMI Prevention tips.

Table 2-5 EMI Prevention/Abatement

EMI Rule	Details
Be aware of RF sources	Keep the unit at least 5 meters or 15 feet away from other EMI sources. Special shielding may be required to eliminate interference problems caused by high frequency, high powered radio or video broadcast signals.
Ground the unit	Poor grounding is the most likely reason a unit will have noisy images. Check grounding of the power cord and power outlet.
Replace all screws, RF gaskets, covers, cores	After you finish repairing or updating the system, replace all covers and tighten all screws. Any cable with an external connection requires a magnet wrap at each end. Install the shield over the front of card cage. Loose or missing covers or RF gaskets allow radio frequencies to interfere with the ultrasound signals.
Replace broken RF gaskets	If more than 20% or a pair of the fingers on an RF gasket are broken, replace the gasket. Do not turn on the unit until any loose metallic part is removed.
Do not place labels where RF gaskets touch metal	Never place a label where RF gaskets meet the unit. Otherwise, the gap created will permit RF leakage. Or, if a label has been found in such a position, move the label.
Use GE specified harnesses and peripherals	The interconnect cables are grounded and require ferrite beads and other shielding. Also, cable length, material, and routing are all important; do not change from what is specified.
Take care with cellular phones	Cellular phones may transmit a 5 V/m signal; that could cause image artifacts.
Properly dress peripheral cables	Do not allow cables to lie across the top of the card cage or hang out of the peripheral bays. Loop the excess length for peripheral cables inside the peripheral bays. Attach the monitor cables to the frame.

2-2-6 Probes Environmental Requirements

Table 2-6 Operation and storage Temperatures for Probes

	ELECTRONIC
Operation:	10 to 40 degree C(50 to 104 degree F)
Storage:	-20 to 50 degree C(-4 to 122 degree F)
Temperatures in degree C, conversion to degree F = degree C*(9/5) + 32)	

*NOTE: Temperature in degrees C. Conversion to Degrees F = (Degrees C * 9/5) + 32).*

NOTICE

SYSTEMS AND ELECTRONIC PROBES ARE DESIGNED FOR STORAGE TEMPERATURES OF -20 TO + 50(-4 to 122 degree F) degrees C. WHEN EXPOSED TO LARGE TEMPERATURE VARIATIONS, THE PRODUCT SHOULD BE KEPT IN ROOM TEMPERATURE FOR 10 HOURS BEFORE USE.

2-2-7 Time and Manpower Requirements

Site preparation takes time. Begin Pre-installation checks as soon as possible. If possible, allow six weeks before delivery, for enough time to make necessary changes.

CAUTION

Have two people available to deliver and unpack the LOGIQ™ 3.
Attempts to move the unit considerable distances or on an incline by one person could result in injury or damage or both.

Section 2-3
Facility Needs

2-3-1 Purchaser Responsibilities

The work and materials needed to prepare the site is the responsibility of the purchaser. Delay, confusion, and waste of manpower can be avoided by completing pre installation work before delivery. Use the Pre installation checklist to verify that all needed steps have been taken. Purchaser responsibility includes:

- Procuring the materials required.
- Completing the preparations before delivery of the ultrasound system.
- Paying the costs for any alterations and modifications not specifically provided in the sales contract.

NOTE: All electrical installations that are preliminary to the positioning of the equipment at the site prepared for the equipment must be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations, and testing must also be performed by qualified personnel. The products involved (and the accompanying electrical installations) are highly sophisticated and special engineering competence is required. All electrical work on these products must comply with the requirements of applicable electrical codes. The purchaser of GE equipment must only utilize qualified personnel to perform electrical servicing on the equipment.

The desire to use a non–listed or customer provided product or to place an approved product further from the system than the interface kit allows presents challenges to the installation team. To avoid delays during installation, such variances should be made known to the individuals or group performing the installation at the earliest possible date (preferably prior to the purchase).

The ultrasound suite must be clean prior to delivery of the machine. Carpets are not recommended because they collect dust and create static. Potential sources of EMI (electromagnetic interference) should also be investigated before delivery. Dirt, static, and EMI can negatively impact system reliability.

2-3-2 Required Features

NOTE: GE Medical Systems requires a dedicated power and ground for the proper operation of its Ultrasound equipment. This dedicated power shall originate at the last distribution panel before the system.

Sites with a mains power system with defined Neutral and Live:

The dedicated line shall consist of one phase, a neutral (not shared with any other circuit), and a full size ground wire from the distribution panel to the Ultrasound outlet.

Sites with a mains power system without a defined Neutral:

The dedicated line shall consist of one phase (two lines), not shared with any other circuit, and a full size ground wire from the distribution panel to the Ultrasound outlet.

NOTE: Please note that image artifacts can occur, if at any time within the facility, the ground from the main facility's incoming power source to the Ultrasound unit is only a conduit.

- Dedicated single branch power outlet of adequate amperage meeting all local and national codes which is located less than 2.5 m (8 ft.) from the unit’s proposed location
- Door opening is at least 76 cm (30 in) wide
- Proposed location for unit is at least 0.3 m (1 ft.) from the wall for proper cooling of the system
- Power outlet and place for any external peripheral are within 2 m (6.5 ft) of each other with peripheral within 1 m of the unit to connect cables.

NOTE: The LOGIQ™ 3 has three outlets in the unit. One is for the on board peripheral and two for off board peripherals.

- Power outlets for other medical equipment
- Power outlets for test equipment and modem within 1 m (3.2 ft) of unit
- Clean and protected space to store transducers (in their cases or on a rack)
- Material to safely clean probes (done with a plastic container, never metal)

2-3-2-1 Desirable Ultrasound Room Facilities

- Door is at least 92cm (3 ft.) wide
- Circuit breaker for dedicated power outlet is easily accessible
- Lab sink with hot and cold water
- Receptacle for bio–hazardous waste, like used probe sheaths
- Emergency oxygen supply
- Storage for linens and film
- Medical equipment storage
- Hospital grade equipment electrical outlet
- Analog telephone line for connection to InSite
- Nearby waiting room, lavatory, and dressing room
- Dual level lighting (bright and dim)
- Lockable cabinet for GE Software & proprietary manuals
- Trash bin.

2-3-2-2 Minimal Floor Plan Suggestion

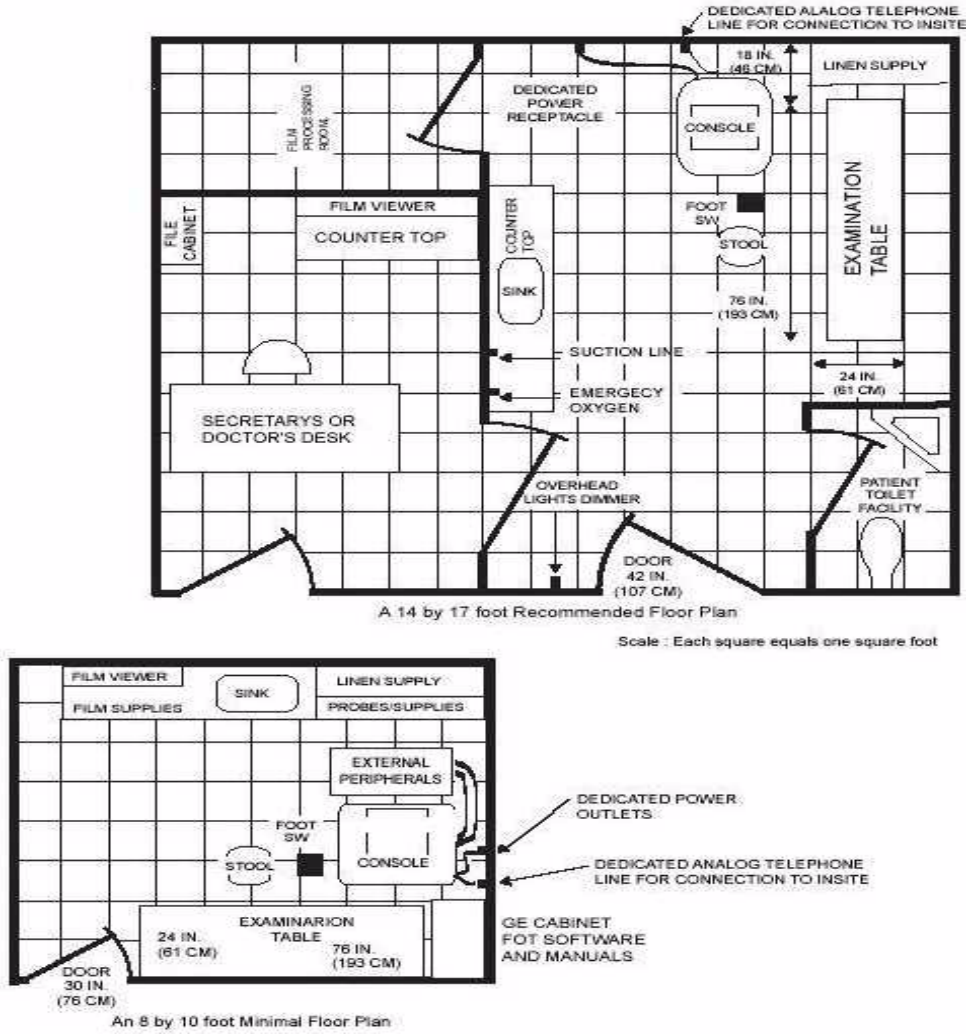


Figure 2-1 Minimal Floor Plan

2-3-3 Networking Pre-installation Requirements

2-3-3-1 Purpose of DICOM Network Function

DICOM services provide the operator with clinically useful features for moving images and patient information over a hospital network. Examples of DICOM services include the transfer of images to workstations for viewing or transferring images to remote printers. As an added benefit, transferring images in this manner frees up the on-board monitor and peripherals, enabling viewing to be done while scanning continues. With DICOM, images can be archived, stored, and retrieved faster, easier, and at a lower cost.

2-3-3-2 DICOM Option Pre-installation Requirements

To configure the LOGIQ™ 3 to work with other network connections, the site's network administrator must provide information to complete the form in *Chapter 2 - Worksheet for DICOM Network Information*.

Information must include:

- A host name, local port number, AE Title, IP address and Sub Net Mask for the LOGIQ™ 3.
- The IP addresses for the default gateway and other routers at the site for ROUTING INFORMATION.
- The host name, IP address, port and AE Title for each device the site wants connected to the LOGIQ™ 3 for DICOM APPLICATION INFORMATION. A field for the make (manufacturer) and the revision of the device, is also included. This information may be useful for solving errors.

2-3-3-2 DICOM Option Pre-installation Requirements (cont'd)

LOGIQ™ 3 Host Name

Local Port

IP Address . . .

AE Title

Net Mask . . .

ROUTING INFORMATION

Destination IP Addresses

GATEWAY IP Addresses

Default . . .

ROUTER1 . . .

ROUTER2 . . .

ROUTER3 . . .

DICOM APPLICATION INFORMATION

	NAME	MAKE/REVISION	AE TITLE	IP ADDRESSES	PORT
Store 1				. . .	
Store 2				. . .	
Store 3				. . .	
Store 4				. . .	
Store 5				. . .	
Store 6				. . .	
Work List				. . .	
Storage Commit				. . .	
MPPS				. . .	

Figure 2-2 Worksheet for DICOM Network Information

This page was intentionally left blank.

Chapter 3
Installation

Section 3-1
Overview

3-1-1 Purpose of Chapter 3

This chapter contains information needed to install the unit. Included are references to a procedure that describes how to receive and unpack the equipment and how to file a damage or loss claim

3-1-2 Chapter Contents

Table 3-1 Contents in Chapter 3

Section	Description	Page Number
3-1	Overview	3-1
3-2	Receiving and Unpacking LOGIQ™ 3	3-3
3-2-1	Safety Reminders	3-7
3-2-2	Moving into Position	3-8
3-2-3	Adjusting System Clock	3-8
3-2-4	Product Locator Installation Card	3-8
3-3	Preparing for Installation	3-9
3-4	Completing the Installation	3-10
3-5	System Configuration	3-16
3-6	Storage And Operation Requirements	3-18
3-7	Optional Peripherals	3-19
3-9	Connectivity Installation Worksheet	3-32
3-10	Loading Base System Software	3-33
3-11	Loading Application Software	3-41
3-12	Paperwork	3-49

3-1-3 Average Installation Time

Table 3-2 Average Installation Time

Description	Average Installation Time	Comments
Unpacking the scanner	Approximately 0.5 hour	
Scanner wo/options	Approximately 0.5 hour	Dependant on the required configuration

The LOGIQ™ 3 has been designed to be installed and checked out by an experienced service technician in approximately **Four** hours. LOGIQ™ 3 console with optional may take slightly longer.

NOTE: For Installing Options average installation time is approximately between 0.5 - 2hrs depending on the required configuration

3-1-4 Installation Warnings

1.) Since the LOGIQ™ 3 weighs approximately 155 kg (342 lbs)without options, preferably two people should unpack it. Two people are also preferable for installing any additional bulky items.

2.) There are no operator serviceable components. To prevent shock, do not remove any covers or panels. Should problems or malfunctions occur, unplug the power cord. Only qualified service personnel should carry out servicing and troubleshooting.

NOTE: For information regarding packing labels, refer to LABELS ON PACKAGE.

3.) After being transported, the unit may be very cold or hot. If this is the case, allow the unit to acclimate before you turn it on. It requires one hour for each 2.5^{o}C increment in it's temperature, if it is below 10^{o}C or above 40^{o}C.

Equipment damage possibility. Turning the system on without acclimation after arriving at site may cause the system to be damaged

CAUTION

°C	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
°F	140	131	122	113	104	96	86	77	68	59	50	41	32	23	14	5	-4	-13	-22	-31	-40
hrs	8	6	4	2	0	0	0	0	0	0	0	2	4	6	8	10	12	14	16	18	20

Table 3-3 Time for Settlement

Section 3-2
Receiving and Unpacking LOGIQ™ 3

When a new system arrives, ensure that none of the components are damaged or in short supply. If shipping damage or shortage occurs, contact the address shown in Chapter 1.

The Packaging/Unpacking Procedure.

Topics discussed in the Packaging/Unpacking Procedure:

1.) Check the Shipment,
2.) Unpack the Unit,
3.) Handling Incomplete or Damaged Shipment

Please read these procedures before packing/unpacking the LOGIQ™ 3.

We strongly advice you to store the LOGIQ™ 3 packing material in undamaged condition in case of future transportation.

Do not lift the unit by the Keyboard. This may cause equipment damage.

CAUTION

The crate with the LOGIQ™ 3 weighs approximately 195 kg. Be prepared for a sudden shift of weight as the unit is removed from its base (pallet).

CAUTION

Inspect the Sochwatch and tge Tiltwatch. Ensure that they are not fused. (Refer to the instructions attached on the packing Box on howto check the Shockwatch and Tiltwatch)

CAUTION

1.) Cut the two Metal Bands.

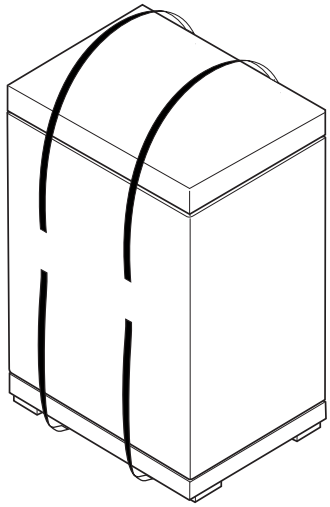


Figure 3-1 Cutting the two metal bands.

Section 3-2 Receiving and Unpacking LOGIQ™ 3 (cont'd)

2.) Lift the TOP Cover up and off.

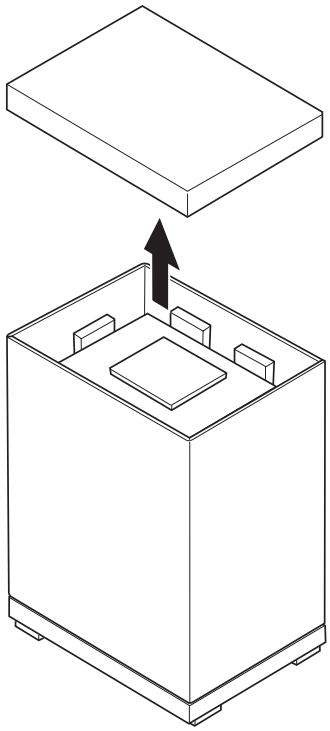


Figure 3-2 Removing the top cover

3.) Remove the Monitor Cap up and off...

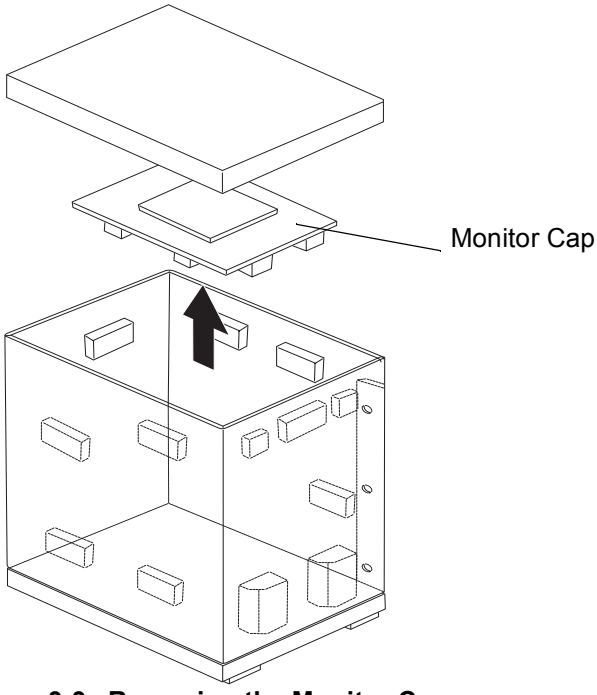


Figure 3-3 Removing the Monitor Cap

Section 3-2 Receiving and Unpacking LOGIQ™ 3 (cont'd)

4.) Remove the three Plastic Joints from the Outer Sleeve.(Refer to the Labels on the Packing Box for more detailed instructions)

5.) Remove the Outer Sleeve.

6.) Remove the Inner Sleeve.

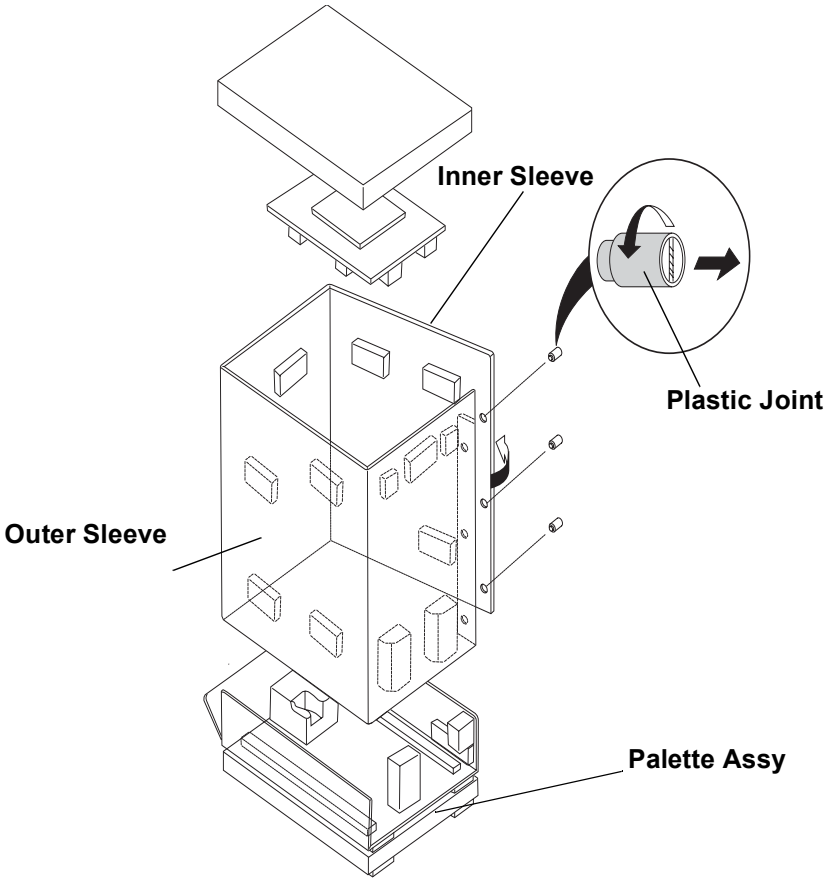


Figure 3-4 Removing Plastic Joints and Sleeves

Section 3-2 Receiving and Unpacking LOGIQ™ 3 (cont'd)

7.) Remove the Plastic Bag and the Plastic Wrapping around the LOGIQ™ 3.
8.) Remove the Monitor Support and Monitor Packing.
9.) Remove the adhesive tapes attached at the four corners of the Top Cover.
10.) Put the Ramp Board on floor and prepare the slope to put the console down.
11.) Unlock the brakes on the front castors, then carefully put the console off the Palette.

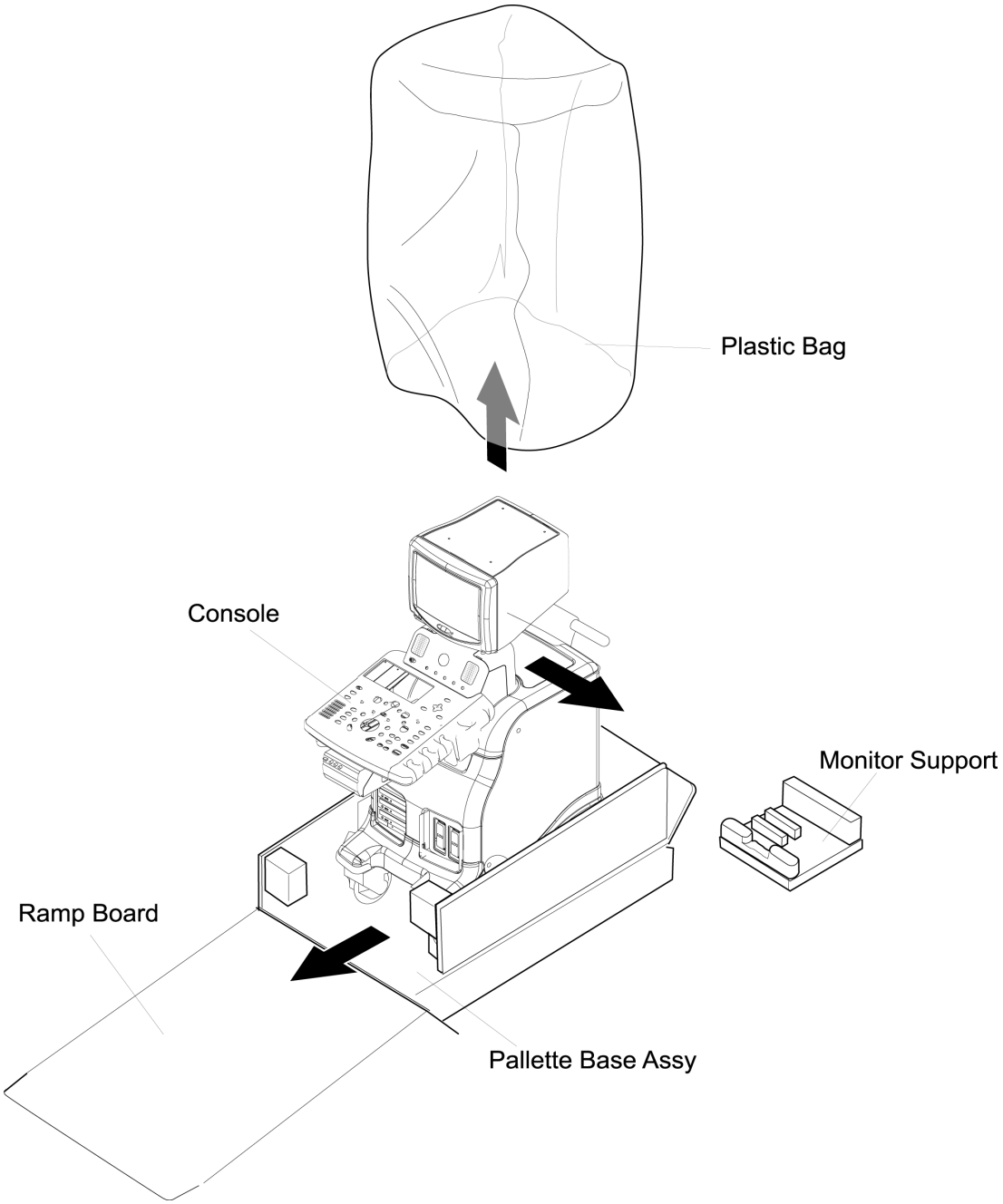


Figure 3-5 Moving the LOGIQ™ 3 from the crate

3-2-1 Safety Reminders

DANGER **WHEN USING ANY TEST INSTRUMENT THAT IS CAPABLE OF OPENING THE AC GROUND LINE (I.E., METER'S GROUND SWITCH IS OPEN), DON'T TOUCH THE UNIT!**

CAUTION **If the unit is very cold or hot, do not turn on its power until it has had a chance to acclimate to its operating environment.**

CAUTION **To prevent electrical shock, connect the unit to a properly grounded power outlet. Do not use a three to two prong adapter. This defeats safety grounding.**

CAUTION **Do NOT wear the ESD wrist strap when you work on live circuits and more than 30 V peak is present.**

CAUTION **Do not operate this unit unless all board covers and frame panels are securely in place. System performance and cooling require this.**

CAUTION **OPERATOR MANUAL(S)**
The User Manual(s) should be fully read and understood before operating the LOGIQ™ 3 and kept near the unit for quick reference.

CAUTION **ACOUSTIC OUTPUT HAZARD**
Although the ultrasound energy transmitted from the LOGIQ™ 3 probe is within AIUM/NEMA standards, avoid unnecessary exposure. Ultrasound energy can produce heat and mechanical damage.

NOTE: Check the shipping container for special instructions. Verify that the container is intact. In some cases a secondary container may be used. If so, ask the carrier for unpacking instructions.

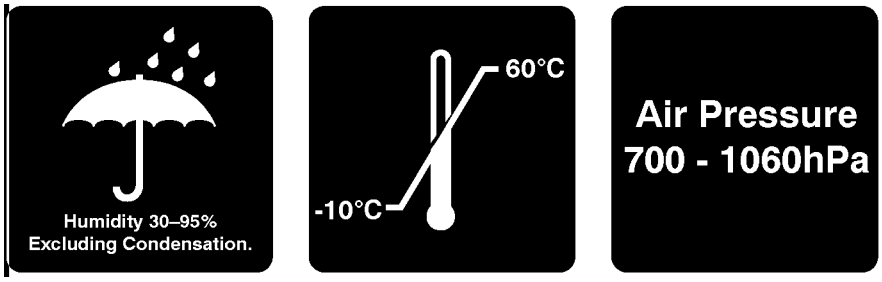


Figure 3-6 LABELS ON PACKAGE

3-2-2 Moving into Position

Do not lift the unit by the Keyboard.
Do not tilt the unit more than 5 degrees to avoid tipping it over.

CAUTION

Equipment Damage Possibility. Lifting the console by holding covers may damage the covers.
Do not lift the console by holding any covers.

CAUTION

In general, a single adult can move the LOGIQ™ 3 along an even surface with no steep grades. At least two people should move the machine when large humps, grooves, or grades are encountered. (It is better to pull from the rear rather than push from the front of the unit). Before moving, store all loose parts in the unit. Wrap transducers in soft cloth or foam to prevent damage.

Although LOGIQ™ 3 is a compact and mobile machine, two people should move it over rough surfaces or up and down grades.

3-2-3 Adjusting System Clock

Set the system clock for the LOGIQ™ 3 to the local time. For procedure of adjusting the system clock, refer to 4-5 Software Configuration Checks, in Chapter 4, FUNCTIONAL CHECKS.

3-2-4 Product Locator Installation Card

Fill out proper customer Information on the Product Locator Installation Card. Mail this Installation Card “Product Locator” to the address corresponding to your pole.

NOTE: The Product Locator Installation Card shown may not be same as the provided Product Locator card.

GE Medical Systems
Mailing Address: Product Locator File
P.O. Box 414
Milwaukee, WI 53201-0414

DESCRIPTION	FDA	MODEL	REV	SERIAL

PREPARE FOR ORDERS THAT DO NOT HAVE A LOCATOR INSTALLATION REPORT

OCP	BS	ORD	DATE (MO-DA-YR)
DIST.-COUNTRY	ROOM		EMPLOYEE NO.
CUSTOMER NO.			

SYSTEM ID NUMBER

INSTALLATION

DESTINATION - NAME AND ADDRESS

ZIP CODE

PRINTED IN USA

INSTALLATION

PRODUCT LOCATOR INSTALLATION CARD

Section 3-3
Preparing for Installation

3-3-1 Verify Customer Order

Compare items received by the customer to that which is listed on the delivery order. Report any items that are missing, back ordered or damaged.

3-3-2 Physical Inspection

3-3-2-1 Systems Voltage Settings

Verify that the recieved scanner is set to the correct voltage.
The Voltage ratings for the LOGIQ™ 3 Scanner is found on Rating label near the Circuit Breaker at the rear of the system

WARNING ***CONNECTING A LOGIQ™ 3 SCANNER TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY THE SCANNER.***

3-3-2-2 Video Formats

Check that the video format is set to the locally used video standard, NTSC or PAL.This can be done in the *Utilities* menu.(Refer to Chapter 16 of the Basic Users Manual for the procedure for changinh the settings)

3-3-3 EMI Protection

This unit has been designed to minimize the effects of Electo-Magnetic Interference (EMI). Many of the covers, shields, and screws are provided primarily to protect the system from image artifacts caused by this interference. For this reason, it is imperative that all covers and hardware are installed and secured before the unit is put into operation.

3-3-4 Checking the Components

When a new system arrives, check that nonne of the components are damaged or in short supply. If shipping damage or shortage occurs, contact the address shown in Chapter 1.

CAUTION **If the Power Plug is Modified or replaced to Suit the local Conditions and regulations, Ground continuity check should be performed between Ground Pin on the Plug and the Metal Part on the LOGIQ™ 3. Refer Section 10-7-4 for more details.**

Section 3-4
Completing the Installation

3-4-1 System Specifications

3-4-1-1 Physical Dimensions

The physical dimensions of the LOGIQ™ 3 unit are summarized in Table 3-4 on page 10 .
The Size of LOGIQ™ 3, with monitor and peripherals

Table 3-4 Physical Dimension of LOGIQ™ 3

Height	Width	Depth	Unit
136	49.0	96	cm
53.54	19.29	37.79	inches

WEIGHT: 155kg (342lbs)

NOTE: Length is in mm
Variation: +/- 5%

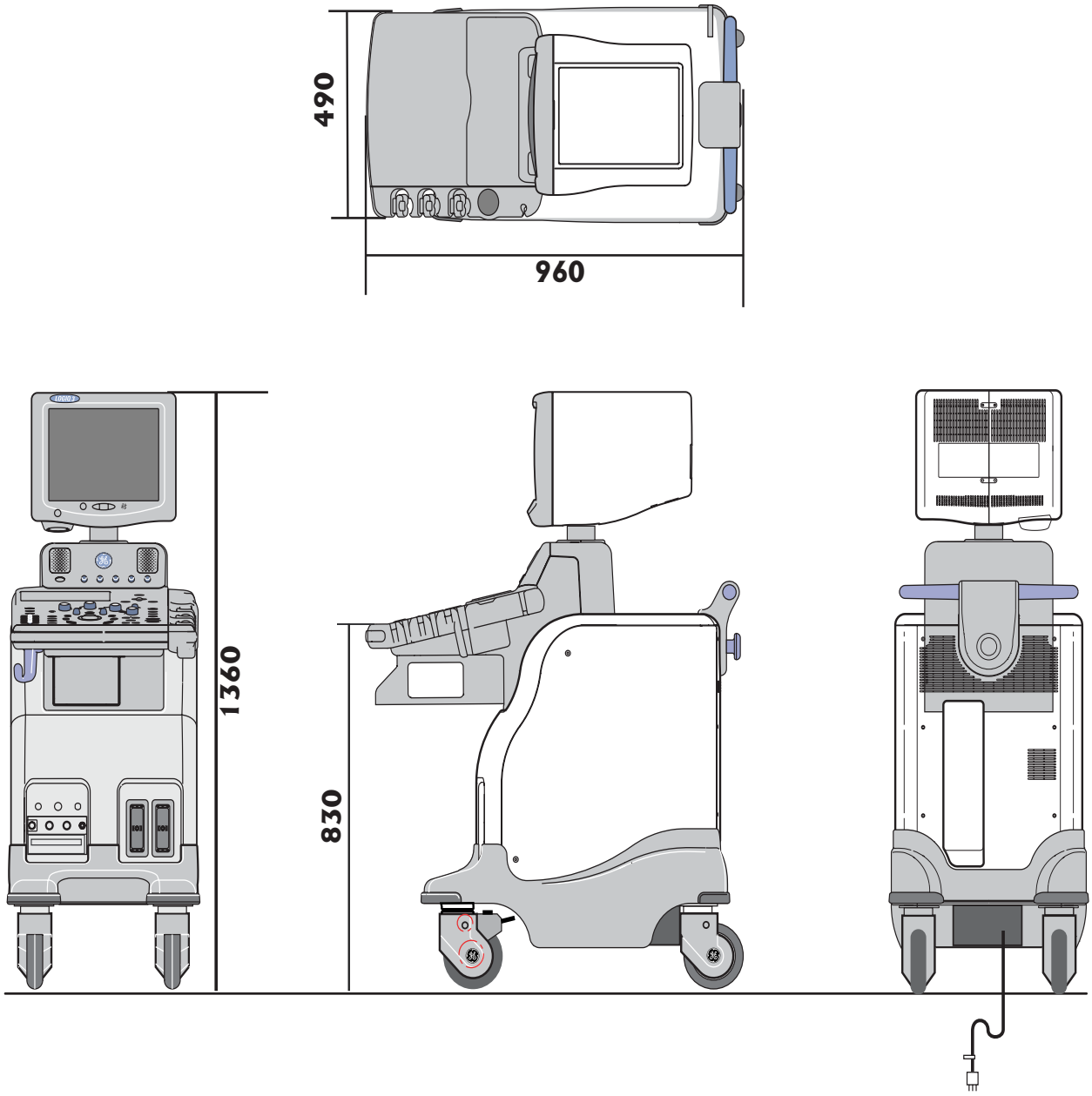


Figure 3-7 OVERALL DIMENSIONS

3-4-1-2 Weight with Monitor and without Peripherals

The Weight of LOGIQ™ 3 with monitor, without peripherals

Table 3-5 Weight of LOGIQ™ 3

Model	Weight [Kg]	Weight [lbs]
LOGIQ™ 3	155	342

3-4-1-3 Acoustic Noise Output:

Less than 70dB (A) according to DIN 45635 - 19 - 01 - KL2.

3-4-2 Electrical Specifications

Electrical conduit, junction boxes, outlets, circuit breakers, and switches should be in place before installing the LOGIQ™ 3 console

Table 3-6 Electrical Specification for LOGIQ™ 3

System	Voltage	Current	Frequency
1	100 ~ VAC	10A	50-60 Hz
2	115 ~ VAC	8.2A	50-60 Hz
3	230 ~ VAC	4,1A	50-60 HZ

3-4-3 Probe (Transducer) Connection

1.) Connect a transducer to the upper transducer receptacle as follows:

A.) Ensure that the transducer twist lock lever points towards the 9 o'clock position.

B.) Insert the transducer connector on the receptacle guide pin until it touches the receptacle mating surface.

C.) Twist the transducer twist lock lever to the 2 o'clock position to lock it in place. Twist the lever to the 9 o'clock position to disconnect the transducer.

NOTE: It is not necessary to turn OFF power to connect or disconnect a transducer.

Connect the main power cable to a hospital grade power receptacle with the proper rated voltage checked during pre installation. Never use a three-to-two prong adapter; this defeats the safety ground.

3-4-4 Power On / Boot Up

NOTE: After turning off a system, wait at least ten seconds before turning it on again. The system may not be able to boot if power is recycled too quickly.

3-4-4-1 Scanner Power On

1.) Connect the Power Cable to the back of the system.

2.) Ensure the Cable Clip slips securely over the shoulders on the molded plug.

3.) Connect the Main Power Cable to a hospital grade power receptacle with the proper rated voltage. Never use an adapter that would defeat the safety ground.

4.) Switch ON the Circuit Breaker at the rear of the system.

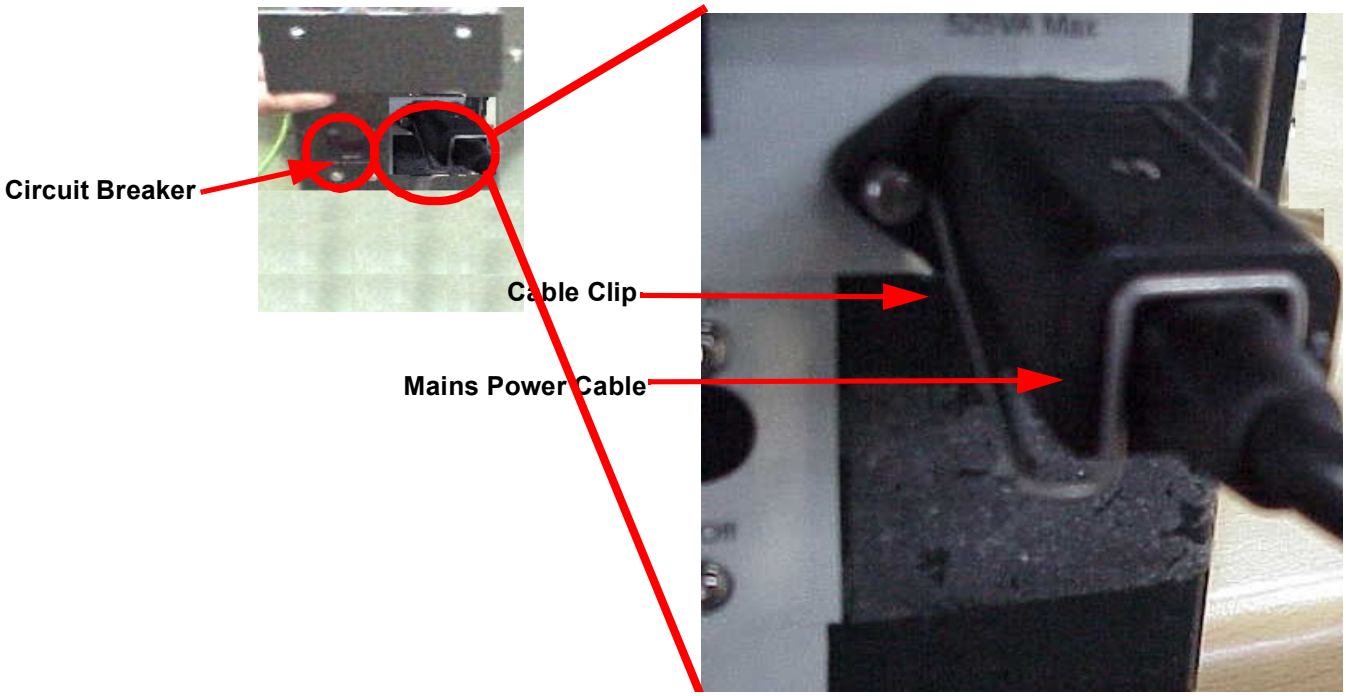


Figure 3-8 Circuit Breaker and Power Cable on Back of Scanner

When power is applied to the scanner and the rear Circuit Breaker is turned ON, power is distributed to the Transformer Assembly.

3-4-4-2 Back-end Processor Boot Up

Press the **Standby** switch on the Control Panel once.

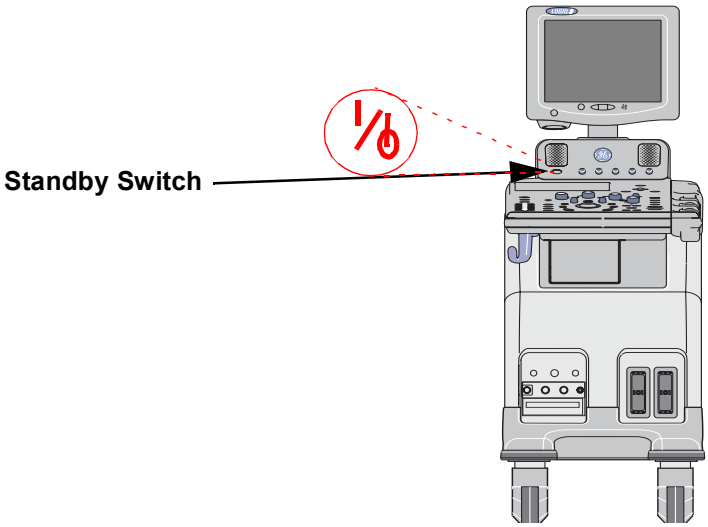


Figure 3-9 Standby Switch for Back-end Processor Boot Up

When the **Standby** switch on the Control Panel is pressed once, the Power is distributed to the Front-End, to the Peripheral outlets and to the Back End Processor. The Back End Processor starts and the software is initiated to start the scanner.

No status messages are displayed during this process.

3-4-5 Power Off/ Shutdown

NOTE: After turning off a system, wait at least ten seconds before turning it on again. The system may not be able to boot if power is recycled too quickly.

3-4-5-1 Back-end Processor Power Down

1.) Press the **Standby** switch on the Control Panel once to display the SYSTEM - EXIT menu.
2.) Select Shutdown from the SYSTEM - EXIT menu.

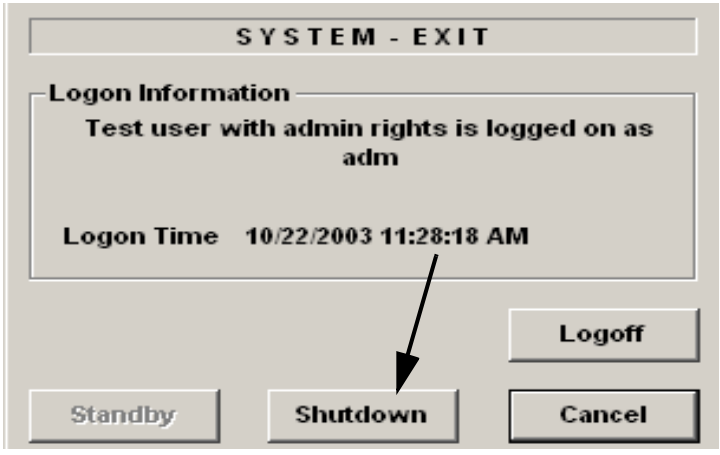


Figure 3-10 System Exit Menu for Back-end Processor Power Down

3-4-5-2 Scanner Shutdown

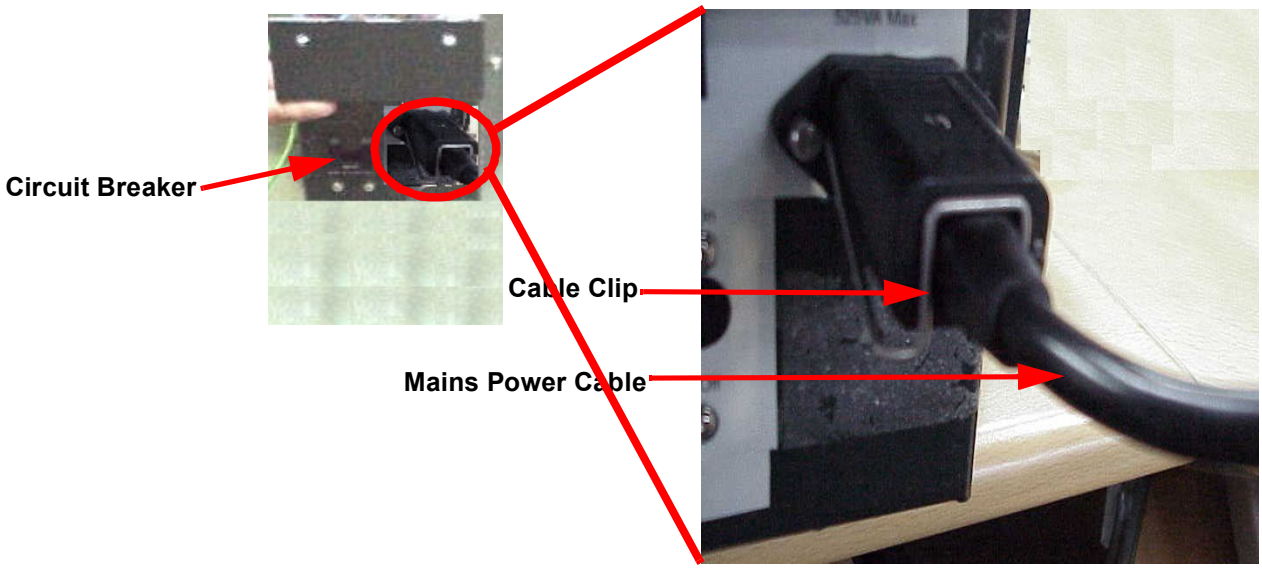


Figure 3-11 Circuit Breaker and Power Cable on Back of Scanner

1.) Switch OFF the Circuit Breaker at the back of the system.
2.) Disconnect the Mains Power Cable if necessary. *For example:* Relocating the scanner.

NOTICE

Disconnecting the Mains Power Cable *before* switching OFF the Circuit Breaker will activate the uninterruptible power system (UPS) in the backend processor, forcing an ordered shutdown of the system.

NOTICE

The UPS serves *only* as a battery backup that allows for a soft shut-down of the scanner to prevent file corruption. **IT DOES NOT REGULATE INCOMING VOLTAGE**.

Section 3-5
System Configuration

3-5-1 System Configuration

3-5-1-1 System Settings

Table 3-1 System Configuration

Configuration Category	Description
Settings	Enables the user or service personnel to set the date, time, unit, language, basic information about the organization such as the institution name and department.

1.) Power OFF the scanner.

2.) The SYSTEM EXIT window appears. Click on **Logoff.**

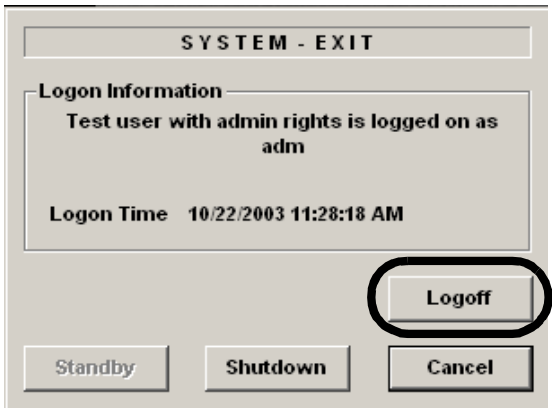


Figure 3-12 System EXIT window

3.) The message window appears. Click on OK.

4.) The OPERATOR LOGIN window appears.Change the User level to **Admin,** then enter **Password,** Then Click on **LOGON**

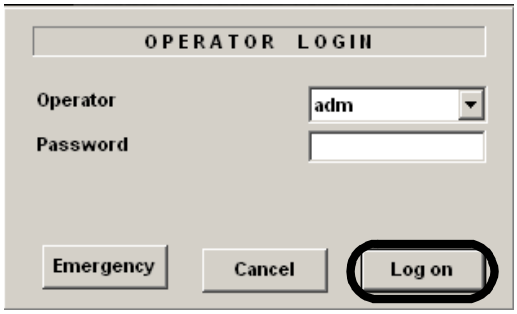


Figure 3-13 Operator Login Window

5.) Select **Utilities > System**

6.) Set the **Hospital name, Department, Date and Time, Language,** and **Units.**

7.) Click on Save the changes or cancel to revert back to previous settings.

8.) Click on Exit or Utilities to terminate the utility function.

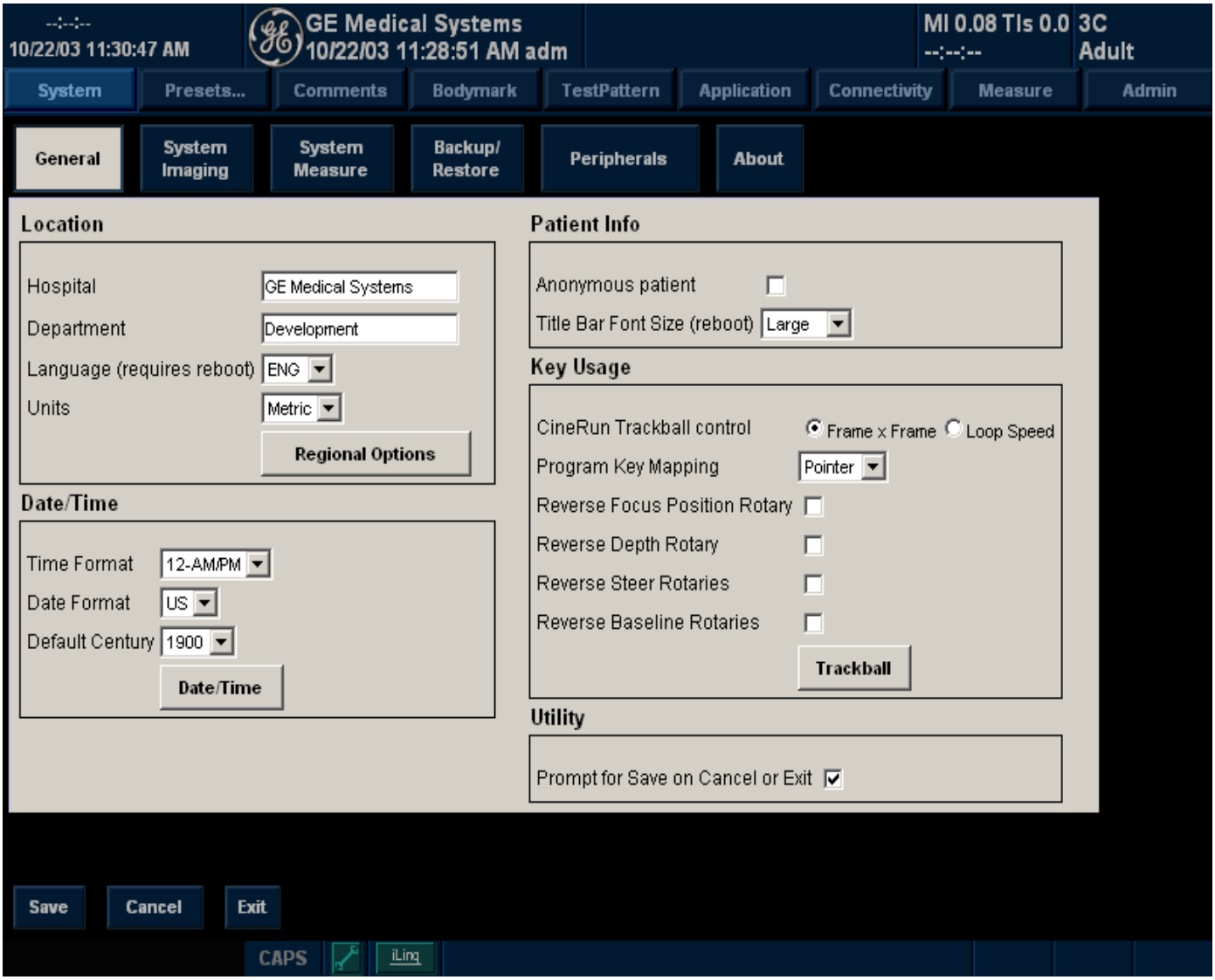


Figure 3-14 Utilities Window

Section 3-6
Storage And Operation Requirements

The LOGIQ™ 3 is shipped in a single container excluding PROBES. Shipping weight is approximately 430 lbs (195kg). The size of the container is B120 cm x W66 cm x H139 cm. (47 in. x 26 in. x 55 in). Table 3-1 provides a summary of temperature, atmospheric pressure, and humidity tolerances for shipping, installation, and operation:

Table 3-2 STORAGE AND OPERATION REQUIREMENTS

Parameter	Storage	Operation
Temperature (Deg C) (Deg F)	-10 to 60 14 to 140	10 to 40 50 to 104
Atmospheric Pressure (hPa)	700 to 1060	700 to 1060
Humidly (%) (non-condensing)	30 to 95	30 to 85

Section 3-7
Optional Peripherals

3-7-1 Optional Peripherals/Peripheral Connection

See the Internal and External I/O description in Chapter 5.

3-7-1-1 Approved peripherals

The tables below shows the suggested optional peripherals for LOGIQ™ 3. B/W Video Printer is the only On-board peripheral. All other peripherals are Off-board.

Table 3-3 List of Recording Devices

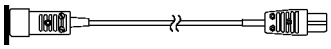
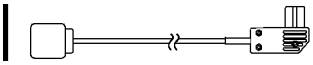
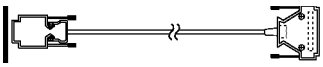
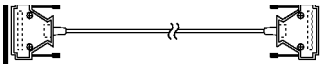
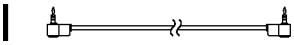
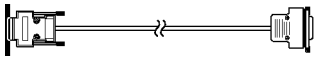
Device	Manufacturer	Model	Video Signal
B/W Video Printer	SONY	UP-895MDW UP-UPD895MDW	NTSC/PAL
B/W Video Printer	Mitsubishi	P91W P91DW	NTSC/PAL
Video Cassette Recorder	SONY	SVO-9500MD SVO-9500-MDP	NTSC PAL
Video Cassette Recorder	Panasonic	AG-MD835P AG-MD835E	NTSC PAL
A6 Color Video Printer	SONY	UP-21MD UPD-21MD USB UPD-23MD USB	NTSC/PAL
A6 Color Video Printer	Mitsubishi	CP900UM	
A5 Color Video Printer	SONY	UP51MD	NTSC/PAL
PC Printer	HP	HP 990CXi HP6122 HP5652	
Color Video Printer	Mitsubishi	CP 900E CP 900DW	

NOTE: See each option installation instructions for installation and connection procedures.

3-7-1-2 Connecting Cables

CAUTION **Equipment damage possibility. Be sure to use the following recommended connecting cables to connect recording devices and a network with LOGIQ™ 3 console.Failure to do so would result in unstable system behaviour and can possibly damage the Equipment**

Table 3-4 LIST OF CONNECTING CABLES

Name	Part No.	Figure	NOTE
Power Cable	P9509EE		Use only approved IEC Couplers for peripherals connection to System Rear panel
	P9509MH		Used only for installing Peripherals on front panel of the console
RS232C Cable	P9509MN		For control signals
	P9509NA		For InSite connection
Mini-Plug Cable	P9509BE		For control signals (used only for B/W video printer)
Ethernet Cable	2195662		For DICOM capability Included in the DICOM Support option with Transceivers

3-7-1-3 Power Consumption of Optional Peripherals

Table 3-5 Power Consumption of Optional Recording Devices

Device	Manufacturer	Model	Power Consumption (VA)
B/W Video Printer	SONY	UP-895MDW UP-UPD895MDW	133 133
B/W Video Printer	Mitsubishi	P91W P91DW	144 144
Video Cassette Recorder	SONY	SVO-9500MD SVO-9500-MDP	72 72
Video Cassette Recorder	Panasonic	AG-MD835P AG-MD835E	39 39
A6 Color Video Printer	SONY	UP-21MD UP-21MD USB UPD-23 MD	216 180 230
A6 Color Video Printer	Mitsubishi	CP900UM	264 264
A5 Color Video Printer	SONY	UP51MD	336
PC Printer	HP	HP 990CXi HP6122 HP5652	60 72 32
PC Printer	Epson	CP 900E CP 900DW	44 44

NOTE: At Any point of time, only one peripheral should be activated.

3-7-2 Available Probes

See in specification in the LOGIQ™ 3 Reference Manual for Probes and intended use.
See Chapter 9 - Renewal Parts for Part Numbers to be used when ordering new or replacement probes.

Table 3-6 LIST OF TRANSDUCERS

Probe Name	Material of Headshell	Area of Using	TYPE	Catalog Number	Part Number
3C	PES	Abdomen, OB/GYN, Urology	Convex	H40412LB	2286354
5C	PES	Abdomen, OB/GYN, Urology	Convex	H40412LA	2294516
3.5C	PES	Abdomen, OB/GYN, Urology	Convex	H4901PE	2296158
3S	NORYL	Cardiac, Transcranial	Sector	H4550SZ	2323337
10LB	NORYL	Vascular, Small Parts, Musculoskeletal, Masso sonography	Linear	H45202LM	2253846
E8C	NORYL/PBT	TRANSVAGINAL	Micro_Convex	H40412LE	2294641
7S	NORYL	Cardiac, Transcranial	Sector	H4000P	2263669

NOTE: PES: Polyethersulfone NORYL: Modified Polyphenylene Oxide PU: Polyurethane
PBT: Polybutylene Terephthalate ABS: Acrylonitrile Butadiene Styrene

3-7-3 Peripherals/Accessories Connector Panel

Connection to the Peripherals and Accessories can be established by connecting to the LOGIQ™ 3 Rear panel.

Located on the panel are video input and output connectors, audio input and output, footswitch connector, power connector and control connections for VCR, printer and service tools.

This section indicates the pin assignment for each connector (1 through 8).

3-7-3 Peripherals/Accessories Connector Panel (cont'd).

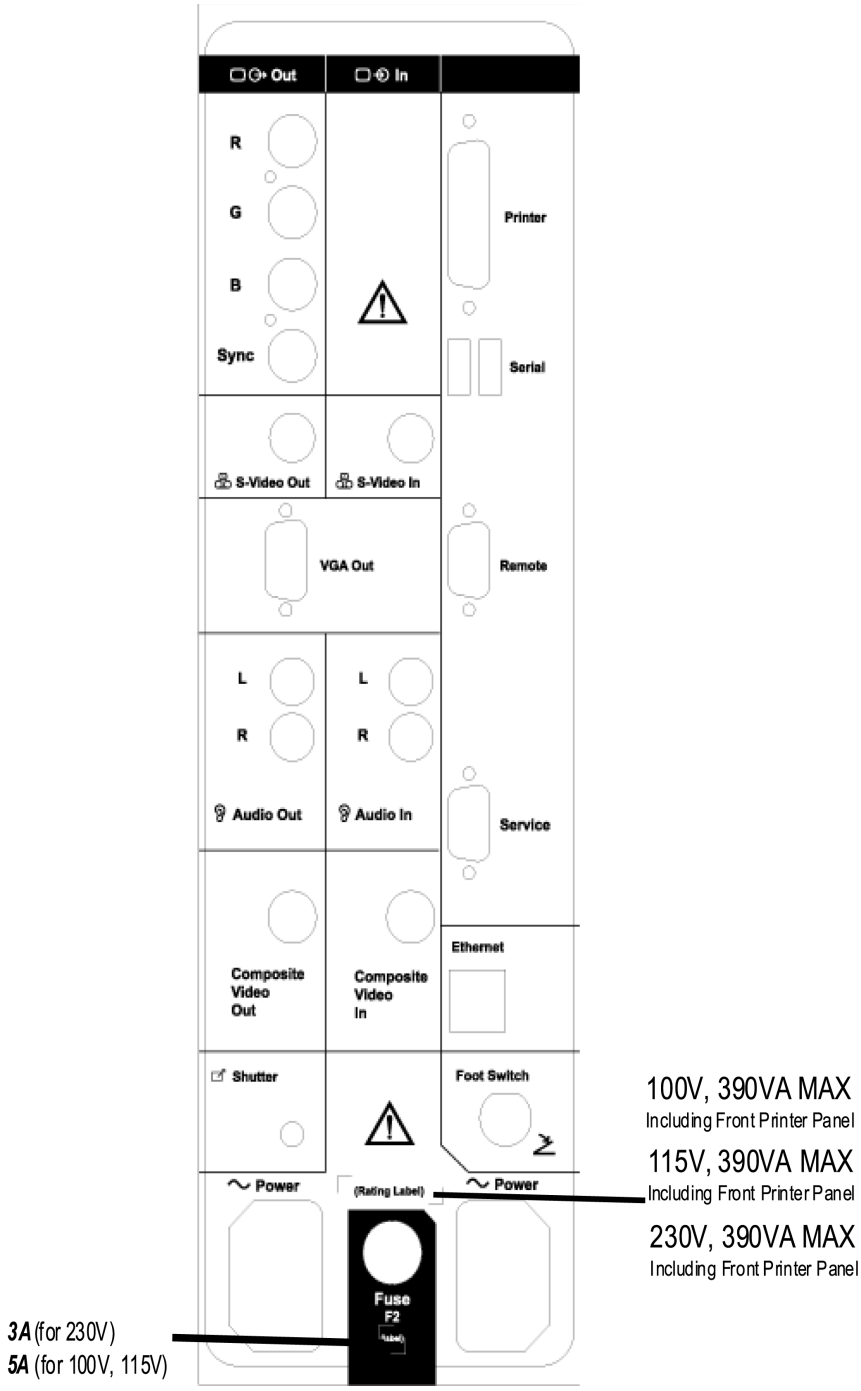


Figure 3-15 Rear Panel for 230V, 115V and 100V

3-7-3 Peripherals/Accessories Connector Panel (cont'd)

External I/O Connectors.

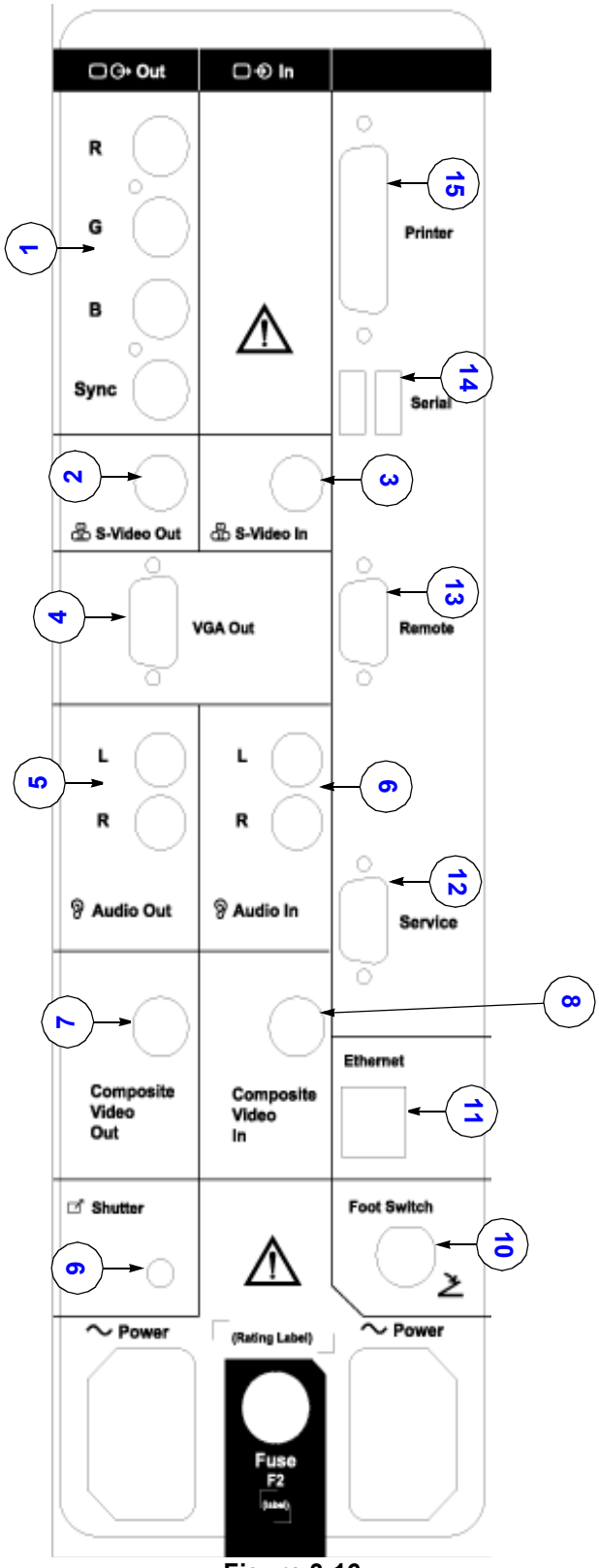


Figure 3-16

3-7-3 Peripherals/Accessories Connector Panel (cont'd)

Table 3-7 External I/O Connector Descriptions

Item	Connector Name	Table Number	Description
1	RGB Sync		BNC Connector, Color Output
2	S-Video Out	Table 3-15	4 pin mini-DIN
3	S- Video In	Table 3-15	4 pin mini-DIN
4	VGA Out	Table 3-16	DSUB-HD22 15 Pin female
5	Audio Out		RCA Phono Jack
6	Audio In		RCA Phono Jack
7	Composite Video Out		BNC Connector, Color Output
8	Composite Video In		BNC Connector, Color Input
9	Shutter	Table 3-14	Mini-phone Jack
10	Foot Switch	Table 3-13	Hirose Electric Co. RM12BRB-5S,
11	Ethernet	Table 3-12	RJ-45 Connector
12	Service	Table 3-8	DSUB 9 pin male
13	Remote	Table 3-10	DSUB 9 pin female
14	USB	Table 3-11	
15	Printer		DSUB 25 pin female

3-7-3 Peripherals/Accessories Connector Panel (cont'd)

1. Pin Assignment of Remote

Connector: D-SUB, 9 Pin, Female

Pin No.	Signal	Pin No.	Signal
1	N/A	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	N/A
5	GND		

Table 3-8 Pin Assignments of RS232C for Remote

NOTE: Output level of RS232C signals:

Table 3-9 Output Level of RS232C signals

High	+3V to +15V
Low	-15V to 0V

2. Pin Assignment of RS232C for Service

Connector: D-SUB, 9Pin, Male

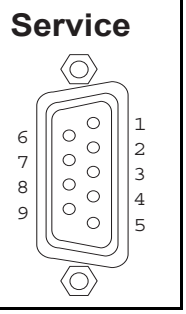
Pin No.	Signal	Pin No.	Signal	Picture
1	NA	6	DSR	
2	RXD	7	RTS	
3	TXD	8	CTS	
4	DTR	9	NA	

Table 3-10 Pin Assignments of RS232C for Service

3-7-3 Peripherals/Accessories Connector Panel (cont'd)

3. Pin Assignment of USB1 & USB2

Connector: USB

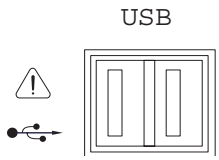
Pin No.	Signal	Pin No.	Signal	Picture
1	+5 VDC	3	DATA +	
2	DATA -	4	GND	

Table 3-11 Pin Assignments of USB

4. Pin Assignment of Ethernet

Connector: RJ45

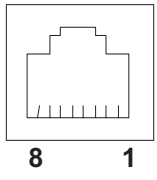
Pin No.	Signal	Pin No.	Signal	Picture
1	TX+	2	TX-	
3	RX+	4	RX-	
5	NA	6	NA	
7	NA	8	NA	

Table 3-12 Pin Assignments of Ethernet

5. Pin Assignment of Foot Switch

Connector: Circularr

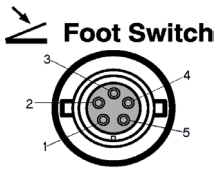
Pin No.	Signal	Picture
1	SW1	
2	GND	
3	SW2	
4	GND	
5	SW3	

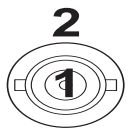
Table 3-13 Pin Assignments of Foot Switch

3-7-3 Peripherals/Accessories Connector Panel (cont'd)

6. Pin Assignment of Mini-Jack

Mini-Jack:

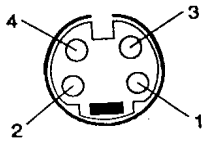
Table 3-14 Pin Assignments of Mini-Jack

Pin No.	Output Signal	Picture
1	Print *	
2	Signal Gnd	

* Printer starts printing by receiving the Low Pulse for more than 100 ms

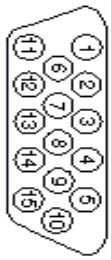
7. S-Video Connector - 4Pin mini-DIN

Table 3-15 S-Video Connector, 4 Pin

Pin No	Output Signal	Description	Picture
1	SVIDEO OUT/IN YG	Y (Luma) GND	
2	SVIDEO OUT/IN CG	C (Chroma) GND	
3	SVIDEO OUT/IN Y	Y (Luma) SIGNAL	
4	SVIDEO OUT/IN C	C (Chroma) SIGNAL	

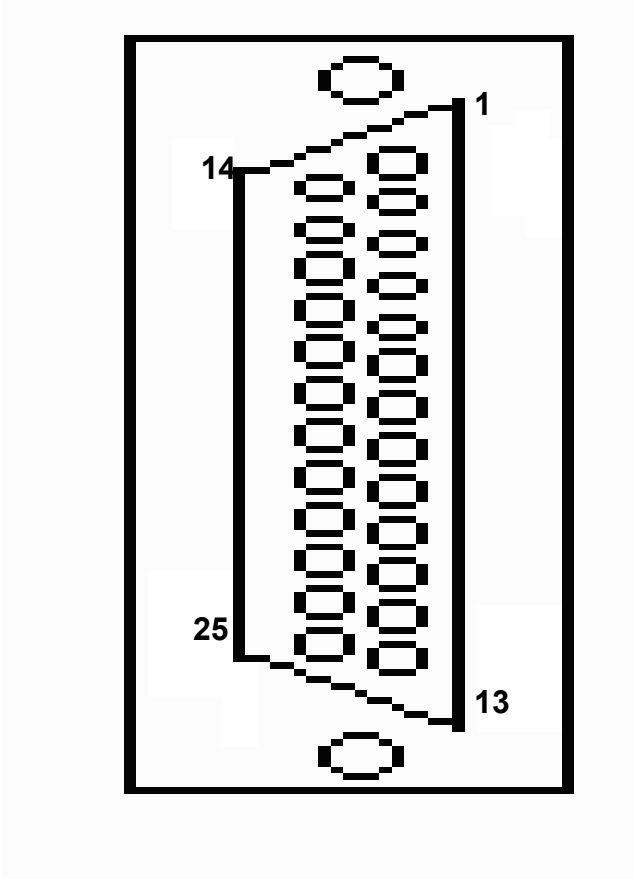
8. VGA Out - DSUB-HD22 15 pin female

Table 3-16 VGA Connector, Shrinked Sub-D 15 Pin

Pin No	Output Signal	Description	Picture
1	VGA OUT1 R	Red	
2	VGA OUT1 G	Green	
3	VGA OUT1 B	Blue	
4, 9,11,12,15	N/C	N/C	
5, 6, 7, 8, 10	GND	GND	
13	VGA OUT1 HS	H Sync	
14	VGA OUT1 VS	V Sync	

9. 25 pin printer parallel Port DB-25 Connector.

Table 3-17 DB-25 25 - pin Parallel Port Printer

Pin No.	Description	Picture
1	Strobe	
2	Data 0	
3	Data 1	
4	Data 2	
5	Data 3	
6	Data 4	
7	Data 5	
8	Data 6	
9	Data 7	
10	$\overline{\text{ACK}}$	
11	Busy	
12	Paper Empty	
13	Select	
14	$\overline{\text{Auto Feed}}$	
15	$\overline{\text{Error}}$	
16	Initialize Printer	
17	$\overline{\text{Select Input}}$	
18 - 25	GND	

3-7-4 Video Specification

Table 3-18 VIDEO SPECIFICATIONS

Timing Parameter	1024x768 75Hz	768x576 50Hz	800x600 60Hz	800x600 75Hz	640x480 60Hz	1024x768 60Hz
Horizontal Rate [kHz]	60.02	31.25	37.88	46.88	31.47	48.36
Horizontal Period [µs]	16.66	32.00	26.40	21.33	31.78	20.68
Pixel Clock [MHz]	78.75	29.50	40.00	49.50	24.55	65.00
H Blank Width [µs]	3.66	5.97	6.40	5.17	5.70	4.92
H Sync Width [µs]	1.22	2.34	3.20	1.62	2.36	2.09
H Front Porch [µs]	0.20	0.75	1.00	0.32	0.73	0.37
Active Horizontal Period [µs]	13.00	26.03	20.00	16.16	26.07	15.75
Vertical Rate [Hz]	75.03	50.0	60.32	75.00	59.94	60.00
Vertical Period [ms]	13.33	20.0	16.58	13.33	16.68	16.67
V Sync Width [lines=ms]	32=0.53	49=1.57	28=0.74	25=0.53	45=1.43	38=0.79
V Front Porch [lines=µs]	3=50.00	5=160.0	4=105.60	3=64.00	6=190.70	6=124.10
Equalization Gate [lines=µs]	1=16.66	5=160.0	1=26.4	1=21.3	6=190.7	3=62.00
Lines: Field/Frame	800	625/625	628	625	525/525	806
Active Lines/Frame	768	576	600	600	480	768

Section 3-8
Software Option Configuration

Refer to the LOGIQ™ 3 Basic User Manual, Chapter 16, Customizing Your System for information on configuring items like Hospital, Department, Language, Units (of measure), Date, Time and Date Format.

For information on configuring Software Options, Refer to the LOGIQ™ 3 Basic User Manual, Chapter 16, Customizing Your System.

For information on configuring DICOM Connectivity, Refer to the LOGIQ™ 3 Basic User Manual, Chapter 16, Customizing Your System.

Section 3-9
Connectivity Installation Worksheet

Site System Information

Site:

Dept:

LOGIQ SN: Type:

Floor:

Room:

REV:

Comments:

CONTACT INFORMATION

Name	Title	Phone	E-Mail Address

TCP/IP Settings

Name - AE Title:

IP Settings

IP Address:

Subnet Mask:

Default Gateway:

Remote Archive Setup

Remote Archive IP:

Remote Archive Name:

Services (Destination Devices)

	Device Type	Manufacturer	Name	IP Address	Port	AE Title
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Section 3-10
Loading Base System Software

3-10-1 Before You Load Software

Save to CD-R or MOD any patient data, images, and system presets that have been stored or configured. Installing the base operating software destroys all patient data, images and system setups saved on the system.

3-10-2 Managing Data, Presets and Images

Before loading software, if you need to save Patient Data, Presets or Images, refer to 8-10-4 "Image Management Guide" on page 8-87.

WARNING ***The next steps will destroy ALL data on the Scanner***

3-10-3 Base Load Software Load Procedure For BEP Ver 2.0

NOTE: Disconnect the system from the network and remove all transducers, all External Drives (USB MOD, Flash Sticks, USB Memory etc.,), Switch Off peripherals like (VCR, VGP) before installing Base Load.

1.) Insert the disk labeled “Base System Software Load Image as per BEP Type” into the CDROM drive and switch on the system. The following screen appears, Press any key to Continue.

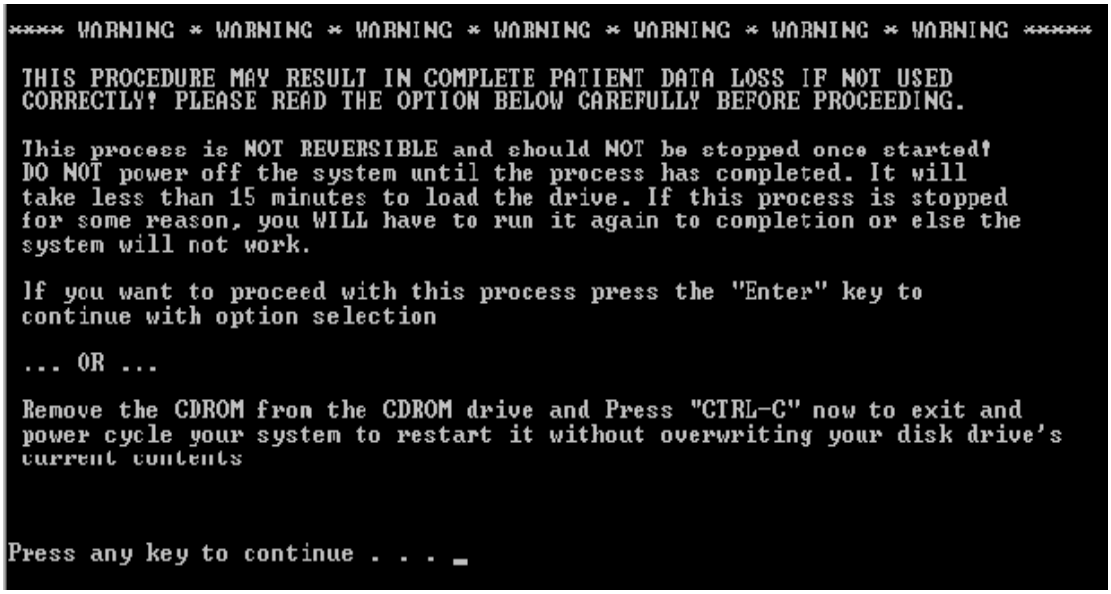

***** WARNING * WARNING * WARNING * WARNING * WARNING * WARNING * WARNING *****
THIS PROCEDURE MAY RESULT IN COMPLETE PATIENT DATA LOSS IF NOT USED CORRECTLY! PLEASE READ THE OPTION BELOW CAREFULLY BEFORE PROCEEDING.
This process is NOT REVERSIBLE and should NOT be stopped once started! DO NOT power off the system until the process has completed. It will take less than 15 minutes to load the drive. If this process is stopped for some reason, you WILL have to run it again to completion or else the system will not work.
If you want to proceed with this process press the "Enter" key to continue with option selection
... OR ...
Remove the CDROM from the CDROM drive and Press "CTRL-C" now to exit and power cycle your system to restart it without overwriting your disk drive's current contents
Press any key to continue . . .

Figure 3-17 Base Load Warning Message

2.) Select Option 1.

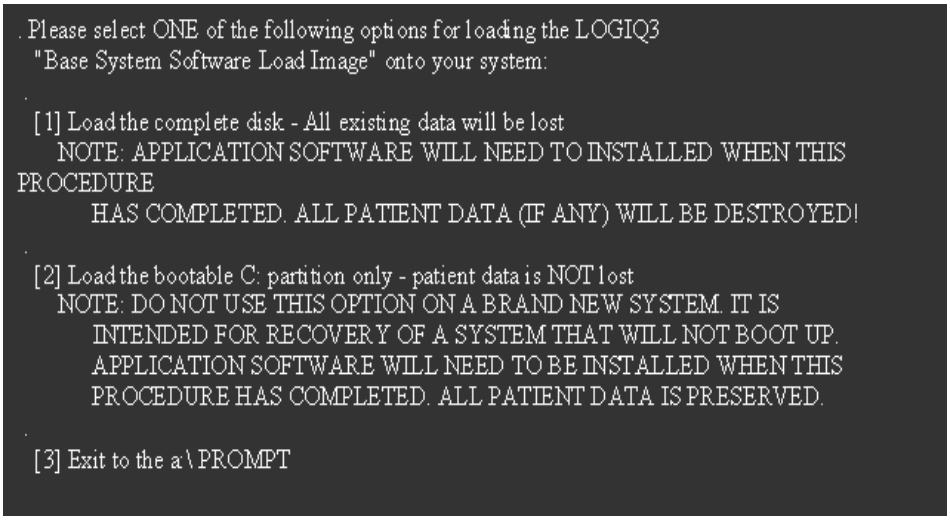

. Please select ONE of the following options for loading the LOGIQ3
"Base System Software Load Image" onto your system:
[1] Load the complete disk - All existing data will be lost
NOTE: APPLICATION SOFTWARE WILL NEED TO INSTALLED WHEN THIS PROCEDURE
HAS COMPLETED. ALL PATIENT DATA (IF ANY) WILL BE DESTROYED!
[2] Load the bootable C: partition only - patient data is NOT lost
NOTE: DO NOT USE THIS OPTION ON A BRAND NEW SYSTEM. IT IS INTENDED FOR RECOVERY OF A SYSTEM THAT WILL NOT BOOT UP. APPLICATION SOFTWARE WILL NEED TO BE INSTALLED WHEN THIS PROCEDURE HAS COMPLETED. ALL PATIENT DATA IS PRESERVED.
[3] Exit to the a:\ PROMPT

Figure 3-18 Base Load Option Message

3.) The second choice is to load only the bootable portion of the hard drive partition, the “C” partition. This is not an option for a new hard drive that has not been previously partitioned for proper LOGIQ 3 operation.

Note: This selection will leave the remaining drive partitions intact.

3-10-3 Base Load Software Load Procedure For BEP Ver 2.0 (cont'd)

4.) You will see a screen showing Ghost. This automatically loads the base software onto the hard disk. Let it run to completion (Approximately 10 minutes).

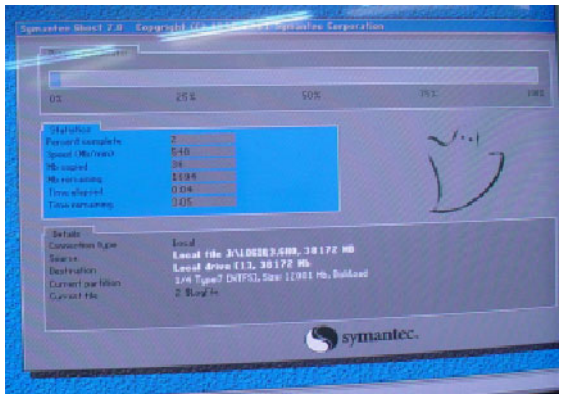


Figure 3-19 Ghost Screen

5.) A message will be displayed when the process is completed.

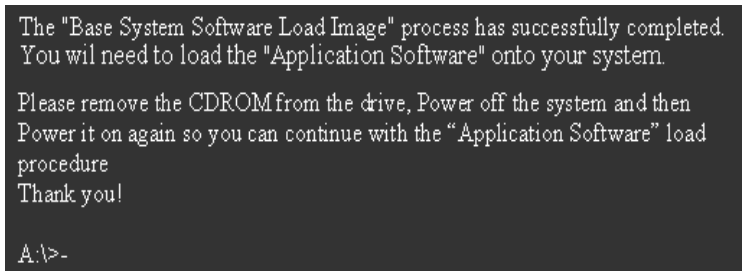

The "Base System Software Load Image" process has successfully completed.
You wil need to load the "Application Software" onto your system.
Please remove the CDROM from the drive, Power off the system and then Power it on again so you can continue with the "Application Software" load procedure
Thank you!
A:\>-

Figure 3-20 Base Load Completion Message

3-10-3 Base Load Software Load Procedure For BEP Ver 2.0 (cont'd)

6.) Remove the CD-ROM

NOTE: Remove the CD-ROM from the drive; otherwise you will be repeating the Base System Software Load process.

7.) After removing the CDROM from the drive, properly turn off the scanner by pressing and holding power on button on keyboard for more than 20 seconds.

8.) Turn the scanner back on. It will now boot up and automatically log on to start checking hardware and Device Manager. This is a normal and should be allowed to run to completion.

NOTE: When booting up the first time it could take 30-90 seconds after the login box appears before the trackball and key board are active. Watch for the arrow cursor to appear.

NOTE: While the script is running, several windows or dialog boxes will appear on the screen. Wait for the "System Settings Change" dialog box "Restart computer now" (approximately 3 minutes after the desktop). Do NOT touch the system during this process. Activating the keyboard, mouse or front panel could corrupt the installation.

NOTE: At times it may look like the system is unresponsive. PATIENCE! The process takes 3-4 minutes. Wait for the "Restart computer now" message to appear before activating the keyboard, mouse or front panel controls.

9.) When you get a message to reboot Windows, wait 15 seconds or until the hour glass disappears and select NO.

3-10-4 Base Load Software Load Procedure For BEP Ver 1.0

NOTE: Disconnect the system from the network and remove all transducers, all External Drives (USB MOD, Flash Sticks, USB Memory etc.,), Switch Off peripherals like (VCR, VGP) before installing Base Load.

1.) Insert the disk labeled “Base System Software Load Image as per BEP Type” into the CDROM drive and switch on the system.On the screen that appears, Press any key to Continue.

2.) You Will See LOGIQ 3 Base Installation screen, It will ask for the 6 digit ID, Enter any 6 digits (e.g, 111111).

Figure 3-21 Base Installation Screen

3.) Enter **‘A’** has the Installation Type.

3-10-4 Base Load Software Load Procedure For BEP Ver 1.0 (cont'd)

4.) You will see a screen showing Ghost. This automatically loads the base software onto the hard disk. Let it run to completion (Approximately 10 minutes).

5.) A Message will be displayed when the process is completed.

6.) Remove the CD-ROM

NOTE: Remove the CD-ROM from the drive; otherwise you will be repeating the Base System Software Load process.

7.) After removing the CDROM from the drive, properly turn off the scanner by pressing and holding power on button on keyboard for more than 20 seconds.

8.) Turn the scanner back on. It will now boot up and automatically log on to start checking hardware and Device Manager. This is a normal and should be allowed to run to completion.

NOTE: When booting up the first time it could take 30-90 seconds after the login box appears before the trackball and key board are active. Watch for the arrow cursor to appear.

NOTE: While the script is running, several windows or dialog boxes will appear on the screen. Wait for the "System Settings Change" dialog box "Restart computer now" (approximately 3 minutes after the desktop). Do NOT touch the system during this process. Activating the keyboard, mouse or front panel could corrupt the installation.

NOTE: At times it may look like the system is unresponsive. PATIENCE! The process takes 3-4 minutes. Wait for the "Restart computer now" message to appear before activating the keyboard, mouse or front panel controls.

9.) When you get a message to reboot Windows, wait 15 seconds or until the hour glass disappears and select NO.

3-10-5 Optional Check Devices

1.) On the desktop, right click on the MY COMPUTER icon, and select PROPERTIES.

2.) Select the Hardware tab, and then the DEVICE MANAGER. It may take up to a minute for the Device Manager screen to appear.

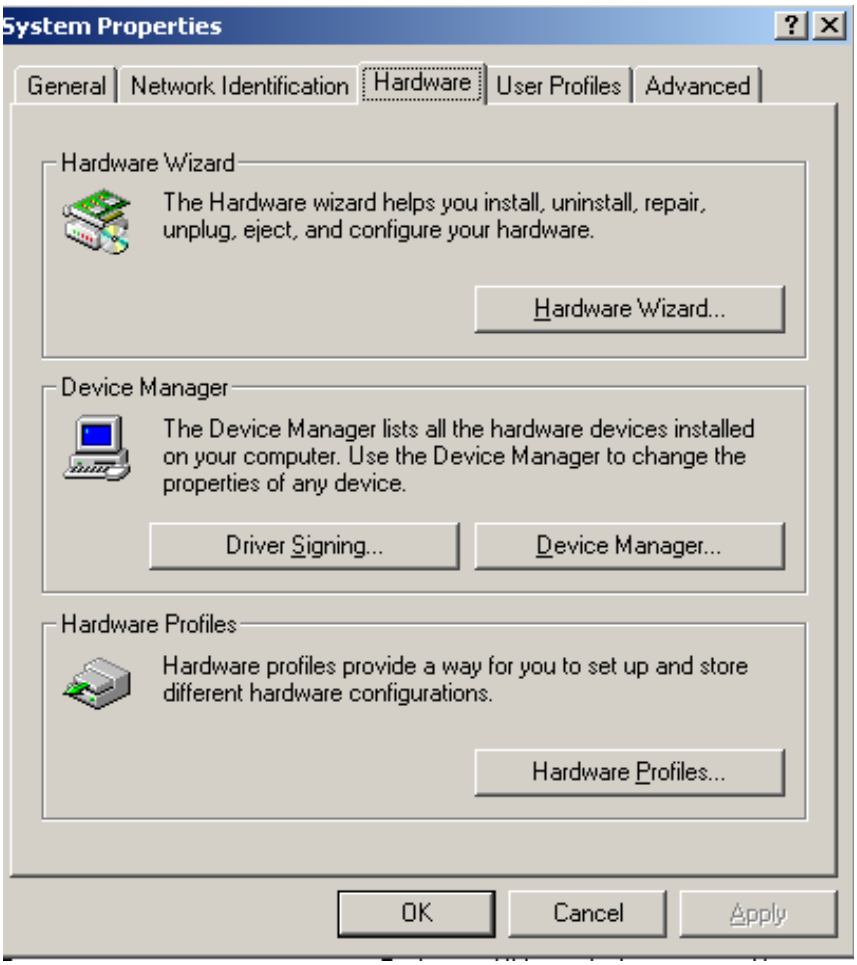
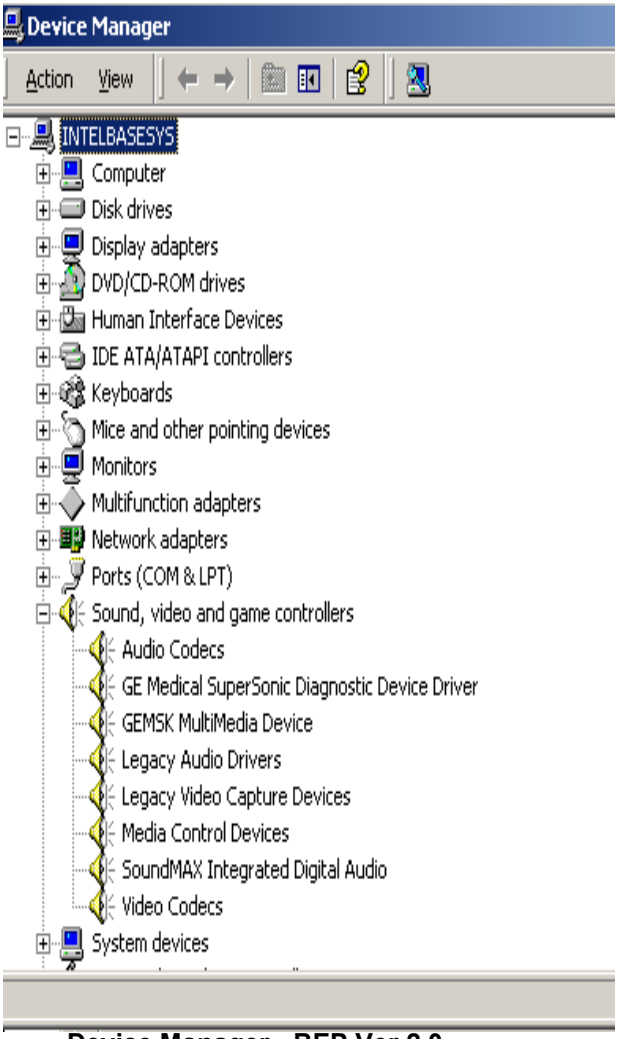

System Properties
General
Network Identification
Hardware
User Profiles
Advanced
Hardware Wizard
The Hardware wizard helps you install, uninstall, repair, unplug, eject, and configure your hardware.
Hardware Wizard...
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Driver Signing...
Device Manager...
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles...
OK
Cancel
Apply

Figure 3-22 System Properties

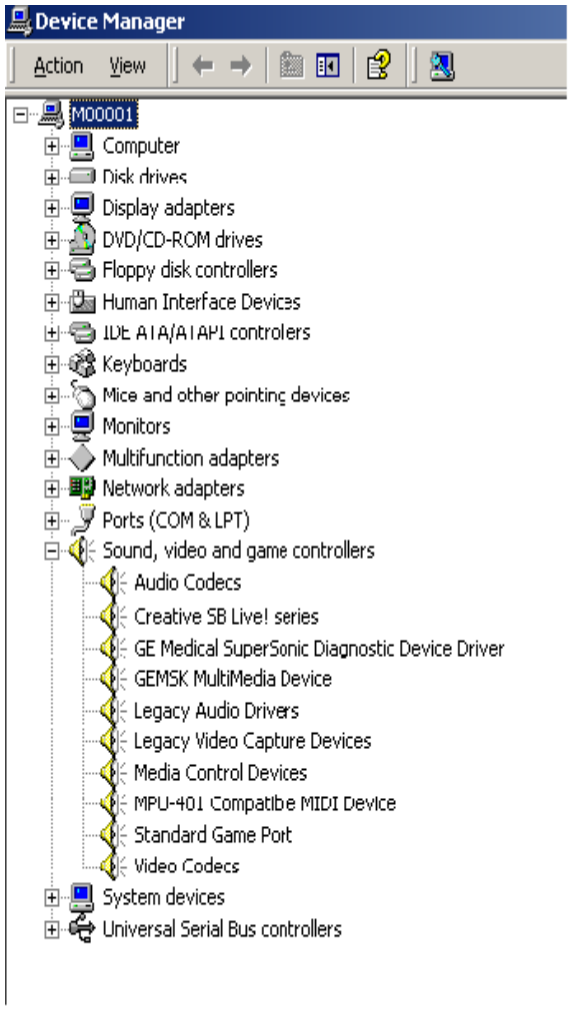
3-11-5 Optional Check Devices (cont'd)

3.) Verify that the Device Manager appears as shown in Figure 3-23. Your display may vary.

4.) You should see no devices with question marks or other icons



Device Manager - BEP Ver 2.0



Device Manager - BEP Ver 1.0

Figure 3-23 Device Manager

5.) Close the **Device Manager** window by selecting the close window X in the corner.

6.) Close the **System Properties** window by selecting the close window X in the corner.

Section 3-11
Loading Application Software

3-11-1 Loading Applications Software

1.) Place the “Application Software” CDROM into the CDROM drive.

2.) Press the Start button on the tool bar at the bottom of the Screen and select “**Run…**”.

Enter “**g:\LoadSoftware.bat**” into the dialog box as shown in Figure 3-24.

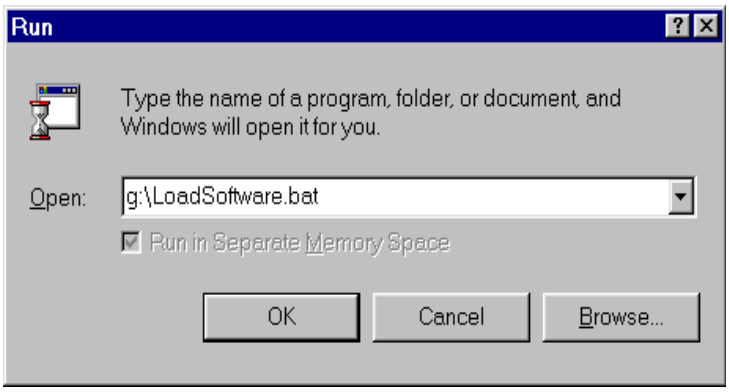


Figure 3-24 Run Load Software

3.) You will see a screen that warns you that you are about to load software, press the Enter key or select OK to start the process.

4.) You will see a Command (CMD) window open as shown in Figure 3-25 on page 42 .

3-11-1 Loading Applications Software (cont'd)

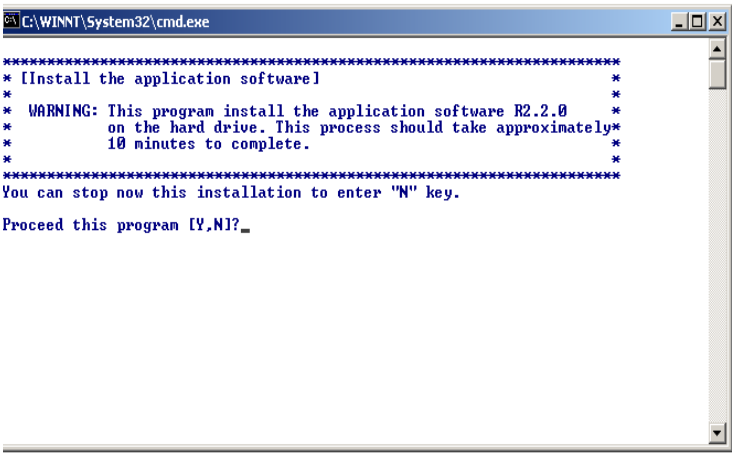

C:\WINNT\System32\cmd.exe
* [Install the application software] *
* WARNING: This program install the application software R2.2.0 *
* on the hard drive. This process should take approximately*
* 10 minutes to complete. *
You can stop now this installation to enter "N" key.
Proceed this program [Y,N]?

Figure 3-25 Application CD Installation Popup

5.) Press Y key twice to start the process.
6.) Wait until the system shuts down automatically (Approximately 5 Minutes to shut down).
7.) Wait for Approximately. 15 seconds.
8.) Power on the System and Remove the CD while it boots.
9.) The System pops up the Screen asking for HW ID Option Key. Enter the Basic Option Key .

3-11-2 Possible Behavior of the First Power Up After Application Load

After installing the new Application Software, if a new Front Panel code is needed:

The first time the Ultrasound application (Echoloader) is run after the software upgrade, the application will detect that the Front Panel code is out of date. Because the Front Panel has to have power removed and re-applied before the Front Panel code update process can continue, the application boot up will automatically shut down the LOGIQ™ 3 just before the application boot up is complete.

In some cases, the system may not shutdown automatically. If the dialog box appears, "Ending Process, Please wait...", please wait 2 minutes. If the system does not turn off, force the shut down by holding down the Standby switch until the monitor turns off then let it complete the power down process.Simply ensure the system has powered down, and the power button light goes off, then restart the system to load the Ultrasound application. The auto-power down will only occur on the first power up after the application upgrade.

3-11-3 System Setup

To complete the system setup:

1.) Connect the system to the network if applicable.
2.) From the Touch Screen on the scanner, select *Utility>Connectivity>TCPIP Tab*.
3.) Ensure that DHCP is deselected so you can enter information manually.
4.) Input the DICOM information.
    * This should be the appropriate DICOM information for the system if it is on the hospital network. If it is not correct, input the correct data.
5.) After all information is entered select SAVE SETTINGS.
6.) If the system is **NOT** on a network you will need to input a set of "dummy" data for proper InSite and Diagnostic operation. Enter the following data if you are not on a network:
    * Computer Name:
    * IP Address: 3.192.28.253
    * Subnet Mask: 255.255.255.0
7.) After all information is entered select SAVE SETTINGS.
8.) Reset the VCR by going to *Utilities>System>Setup*.
9.) Select *Sony 9500 VCR* and SAVE
10.) Select *Exit* in the lower left-hand corner of the Touch Screen.
11.) Do an auto-shut down
12.) Press the **STANDBY** switch on the Control Panel once to display the SYSTEM - EXIT menu.
13.) Select SHUTDOWN from the SYSTEM - EXIT menu.

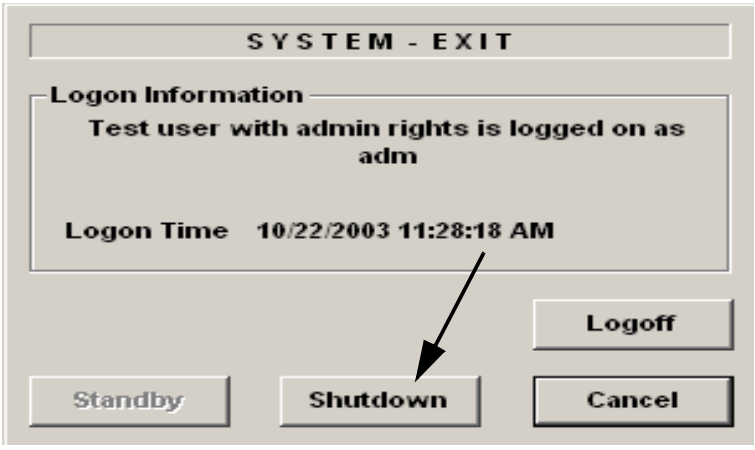


Figure 3-26 System Exit Menu for Back-end Processor Power Down

3-11-4 Upgrading Application Software

WARNING ***While the software install procedure is designed to preserve data, you should save any patient data, images, system setups to a CD-R or MOD or hardcopy.***

Remember to remove the CD-R or MOD before continuing with the software install.

CAUTION

1.) Disconnect the system from the network.
2.) Place the “Application Software” CD-ROM into the CD-ROM drive.
3.) Power Down the scanner.
4.) Power up the scanner. Wait for a dialog box like the one in Figure 3-27.

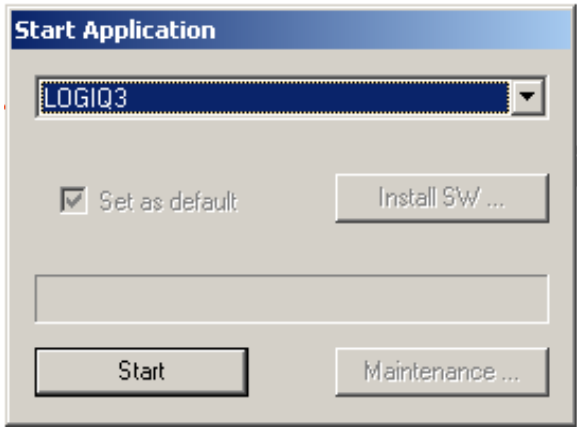


Figure 3-27 Start Application Window

5.) Select INSTALL SW ....
6.) There will be two dialog boxes popping up warning you that you are about to install new software as shown in Figure 3-28. In both cases click OK.

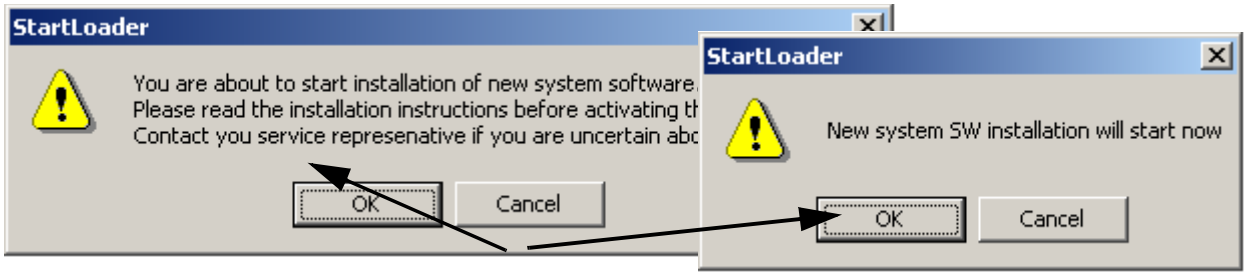

StartLoader
You are about to start installation of new system software.
Please read the installation instructions before activating th
Contact you service represenative if you are uncertain abc
OK
Cancel
StartLoader
New system SW installation will start now
OK
Cancel

Figure 3-28 StartLoader Dialog Boxes

3-11-4 Upgrading Application Software (cont'd)

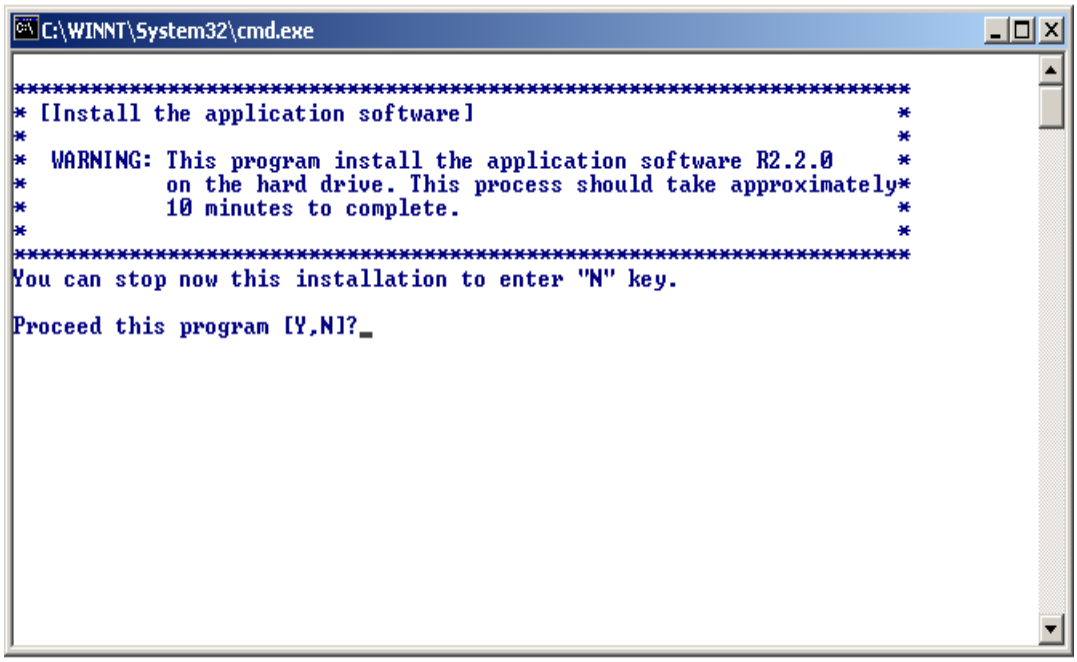

C:\WINNT\System32\cmd.exe
****
* [Install the application software] *
*
* WARNING: This program install the application software R2.2.0 *
* on the hard drive. This process should take approximately*
* 10 minutes to complete. *
*
****
You can stop now this installation to enter "N" key.
Proceed this program [Y,N]?_

Figure 3-29 Command Window

7.) Another window will be displayed asking you to "Press any key to continue…".

8.) As indicated, press any key to continue. The process is completely automated and provides you with messages as to its status. R1.1.1 Software provides the message in Figure 3-30.

LoadSoftware
Ignore all pop-up message boxes during software install. They will be handled automatically. This window will disappear in a couple of minutes.
OK

Figure 3-30 R2.2.0 Software Message

At this point you just have to wait while the software loads (Approximately 10 minutes).

3-11-4 Upgrading Application Software (cont'd)

If possible, while the system is rebooting remove the CD from the drive. If you didn't do that don't worry you will get a dialog box like the one shown in Figure 3-31.

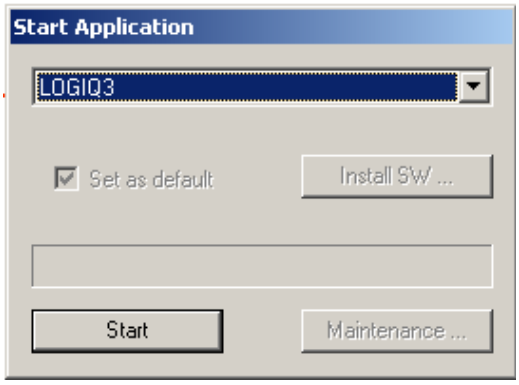


Figure 3-31 Start Software

9.) REMOVE the Applications CD

10.) From the Start Applications dialog box, select START.

11.) Select CANCEL.

3-11-5 Possible Behavior of the First Power Up After Application Load

After installing the new Application Software, if a new Front Panel code is needed:

The first time the Ultrasound application (Echoloader) is run after the software upgrade, the application will detect that the Front Panel code is out of date. Because the Front Panel has to have power removed and re-applied before the Front Panel code update process can continue, the application boot up will automatically shut down the LOGIQ™ 3 just before the application boot up is complete.

In some cases, the system may not shutdown automatically. If the dialog box appears, "Ending Process, Please wait...", please wait 2 minutes. If the system does not turn off, force the shut down by holding down the Standby switch until the monitor turns off then let it complete the power down process.

Simply ensure the system has powered down, and the power button is amber, then restart the system to load the Ultrasound application. The auto-power down will only occur on the first power up after the application upgrade.

3-11-6 System Setup

To complete the system setup:

1.) Connect the scanner to the network if applicable.
2.) From the Touch Screen on the scanner, select *Utility>Connectivity>TCPIP Tab*.
3.) Ensure that DHCP is deselected so you can enter information manually.
4.) Input the DICOM information.
    * This should be the appropriate DICOM information for the system if it is on the hospital network. If it is not correct, input the correct data.
5.) After all information is entered select SAVE SETTINGS.
6.) If the system is **NOT** on a network you will need to input a set of "dummy" data for proper InSite and Diagnostic operation. Enter the following data if you are not on a network:
    * Computer Name:
    * IP Address: 3.192.28.253
    * Subnet Mask: 255.255.255.0
7.) After all information is entered select SAVE SETTINGS.
8.) Reset the VCR by going to *Utilities>System>Setup*.
9.) Select *Sony 9500 VCR* and SAVE
10.) Select *Exit* in the lower left-hand corner of the Touch Screen.
11.) Do an auto-shut down
12.) Press the **STANDBY** switch on the Control Panel once to display the SYSTEM - EXIT menu.
13.) Select SHUTDOWN from the SYSTEM - EXIT menu.

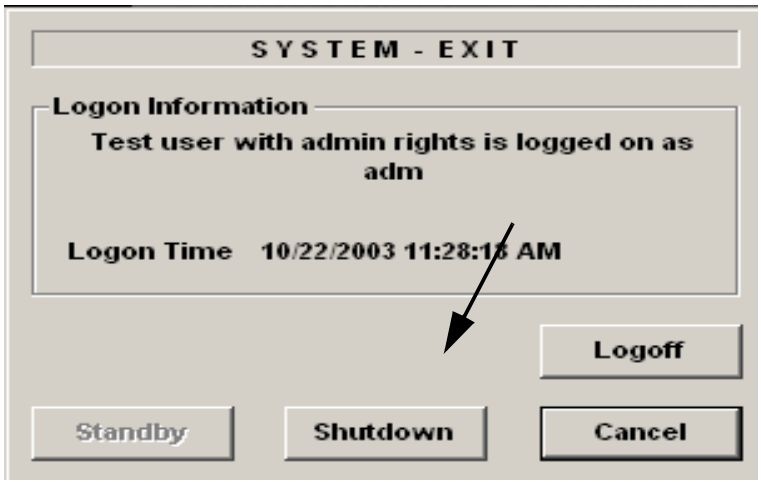


Figure 3-32 System Exit Menu for Back-end Processor Power Down

3-11-7 Restore Patient, Report, and User-Defined Presets

1.) Place the Backup/Restore media (MOD or CD-R) in the drive.
2.) Select the UTILITY tab on the Touch Panel. Select SYSTEM, then BACKUP/RESTORE.
3.) Select everything under Restore by placing a check mark after Patient Archive, Report Archive, System Configuration, and User Defined Configuration. Then press RESTORE.

Section 3-12
Paperwork

NOTE: During and after installation, the documentation (i.e. User Manuals, Installation Manuals...) for the peripheral units must be kept as part of the original system documentation. This will ensure that all relevant safety and user information is available during the operation and service of the complete system.

3-12-1 Product Locator Installation

NOTE: The Product Locator Installation Card shown may not be same as the provided Product Locator card.

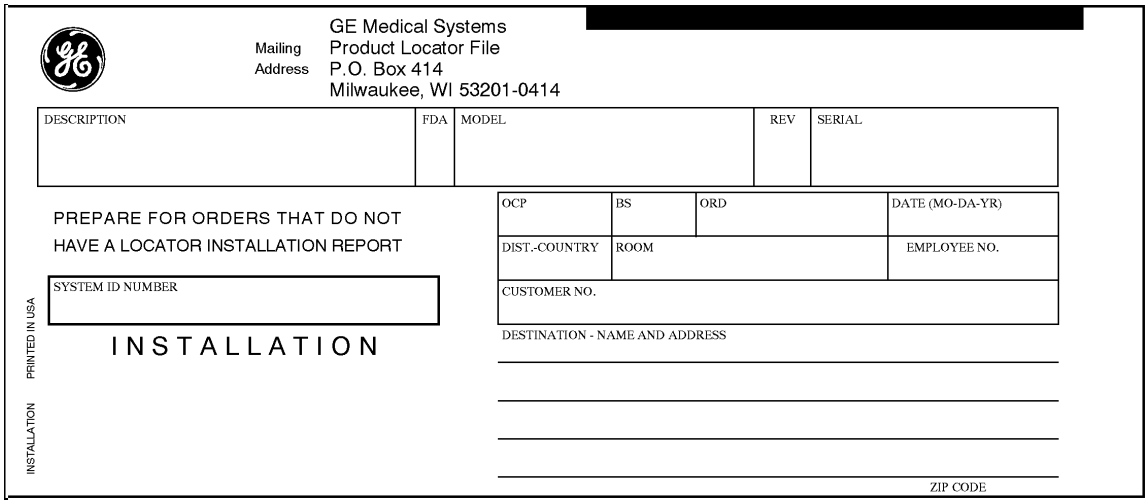


Figure 3-1 Product Locator Installation Card

3-12-2 GE Cares Sticker

Stick GE CARES sticker after Installation. Refer Figure 3-33 for details.

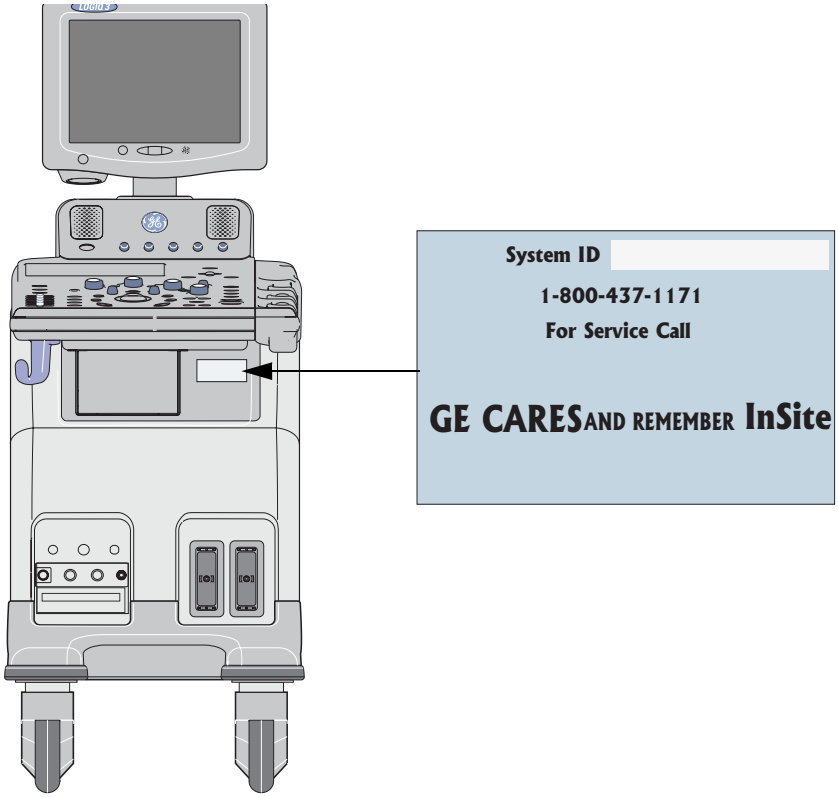


Figure 3-33 GE CARES Sticker Location

3-12-3 User Manual(s)

User Check that the correct User Manual(s) for the system and software revision, is included with the installation. Specific language versions of the User Manual may also be available. Check with your GE Sales Representative for availability.

This page was intentionally left blank.

Chapter 4
Functional Checks

Section 4-1
Overview

4-1-1 Purpose of Chapter 4

This chapter provides procedures for quickly checking major functions of the LOGIQ™ 3 scanner diagnostics by using the built-in service software, and power supply adjustments.

4-1-2 Chapter Contents

Table 4-1 Contents in Chapter 4

Section	Description	Page Number
4-1	Overview	4-1
4-2	Required Equipment	4-1
4-3	General Procedure	4-2
4-4	Functional Checks	4-11
4-5	Software Configuration Checks	4-27
4-6	Peripheral Checks	4-28
4-7	Safety Issues	4-29
4-8	Site Log	4-30

NOTICE **Most of the information pertaining to this** *Functional Checks* **chapter is found in the** *LOGIQ™ 3 Basic User Manual* **(Direction number 2300750-100).**

Look for the letters (BUM) after a section in the Table of Contents to determine if the information is in this chapter or in the *Basic User Manual.*

Section 4-2
Required Equipment

- An empty (blank) CD R/W disk
- At least one transducer. (normally all the transducers used on the system should be checked).

Section 4-3
General Procedure

CAUTION **SYSTEM REQUIRES ALL COVERS**
Operate this unit only when all board covers and frame panels are securely in place. The covers are required for safe operation, good system performance and cooling purposes.

NOTICE Lockout/Tagout Requirements (For USA only)

Follow OSHA Lockout/Tagout requirements by ensuring you are in total control of the Power Cable on the system.

4-3-1 Power On/Boot Up

NOTE: After turning off the system, wait at least ten seconds before turning it on again. The system may not be able to boot if power is recycled too quickly.

4-3-1-1 Scanner Power On

1.) Connect the Main Power Cable at the rear of the System

WARNING ***Protective earth must be taken care when connecting AC power cable without its plug to wall outlet.***

2.) Ensure the retainer clamp slips securely over the shoulders on the molded plug.
3.) Connect the Main Power cable to an appropriate mains power outlet.
4.) Switch ON the Main Circuit Breaker at the rear of the System.

4-3-1 Power On/Boot Up (cont'd)

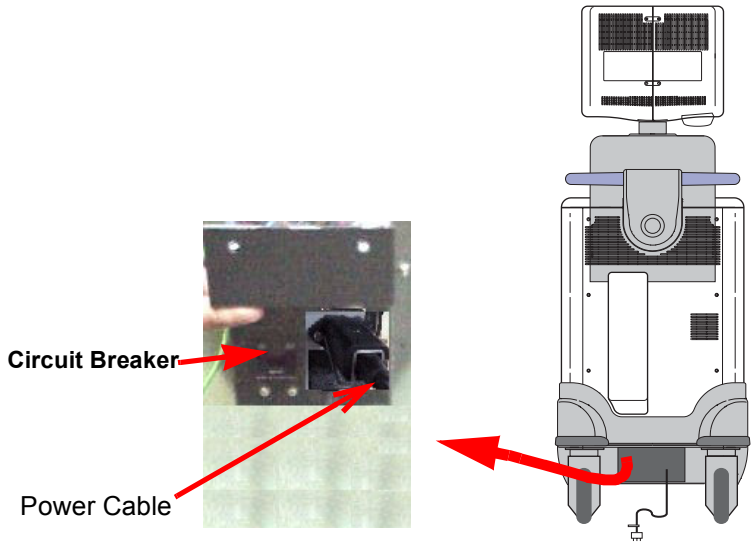


Figure 4-1 Circuit Breaker

When power is applied to the Scanner, and the Rear Circuit breaker is turned ON, Power is distributed to the Transformer Assembly. When the Control panel **ON/OFF** key is pressed once, Fans, Control Panel, Monitor, Internal and External I/O's, Nest Boards, Peripherals and the Back End Processor are given power. Back-end Processor boots up and the system starts in the scanning mode.

Press the **ON/OFF (STANDBY)** Switch on the Control Panel once.

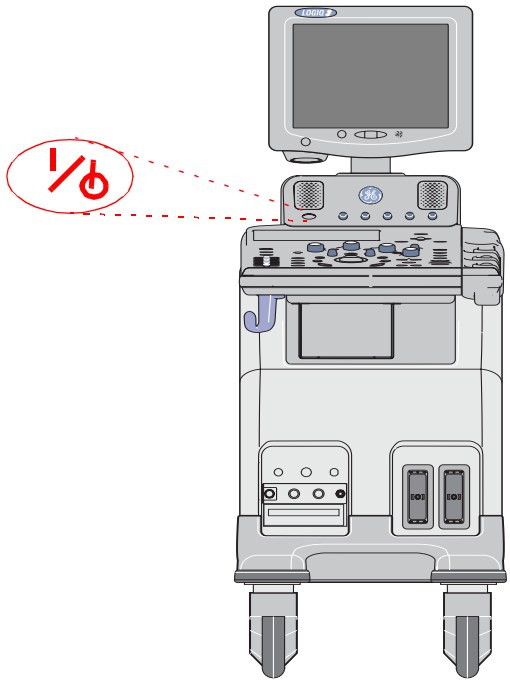


Figure 4-2 Power On/Off Standby Switch Location

4-3-1 Power On/Boot Up (cont'd)

When the **Standby** switch on the Control Panel is pressed once, the Back-end Processor starts and the software code is distributed to initiate the scanner.

No status messages are displayed during this process.

4-3-1-2 Power Off

Purpose: This is a description on how to Shutdown the system.

1.) Press the **ON/OFF**keys on the keyboard
2.) The System Exit dialog box is displayed on the monitor.
Select "Shutdown" from the System Exit dialog box.

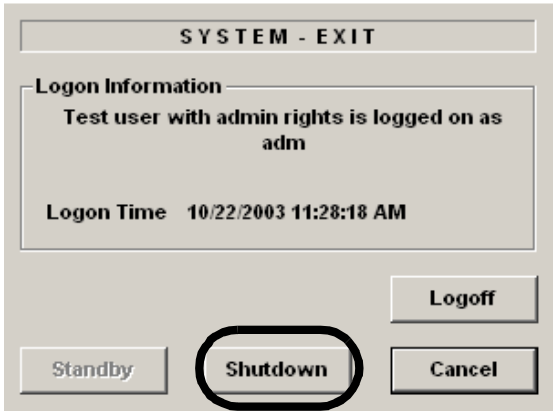


Figure 4-3 System Exit Dialog Box

3.) The power off sequence begins. The system power turns off automatically when the power off sequence is completed.

4-3-1-3 Power Shutdown

1.) Press the **ON/OFF** key at the front of the System once.
2.) The System Exit dialog box is displayed on the monitor.
Select "Shutdown" from the System Exit dialog box
3.) Switch OFF the Main Circuit Breaker at the rear of the system Refer to Figure 4-1 on page 3 .
4.) Disconnect the Main Power Cable if needed.

4-3-2 Using CD-RW Drive/MOD Drive (Optional)

4-3-2-1 Using CD-RW

NOTICE **Never move the unit with a disk in the CD-RW because the drive actuator will not be locked and the CD-RW could break.**

1.) Push the **EJECT** button, the disk tray will appear.
2.) Put the disk onto the disk tray.
3.) Press the **EJECT** button to insert the disk into the CD-RW device.
4.) There are a number of methods to eject a disk from the CD-RW. Ejection is automatic in some cases. Manual ejection methods, listed in preferred order of use, are:
   a.) Press **EJECT** button on the CD-RW while system is ON.

b.) Press and hold **EJECT** button while the system is booting.

c.) Mechanical ejection. Insert the end of a paper clip into the hole next to the EJECT button while system power is OFF.

NOTICE **Avoid mechanical ejection whenever possible. Mechanical ejection leaves the actuator unlocked and the CDR-W susceptible to damage if moved. If forced to use this method, reboot the system, then insert and eject a known good disk using one of the other methods.**

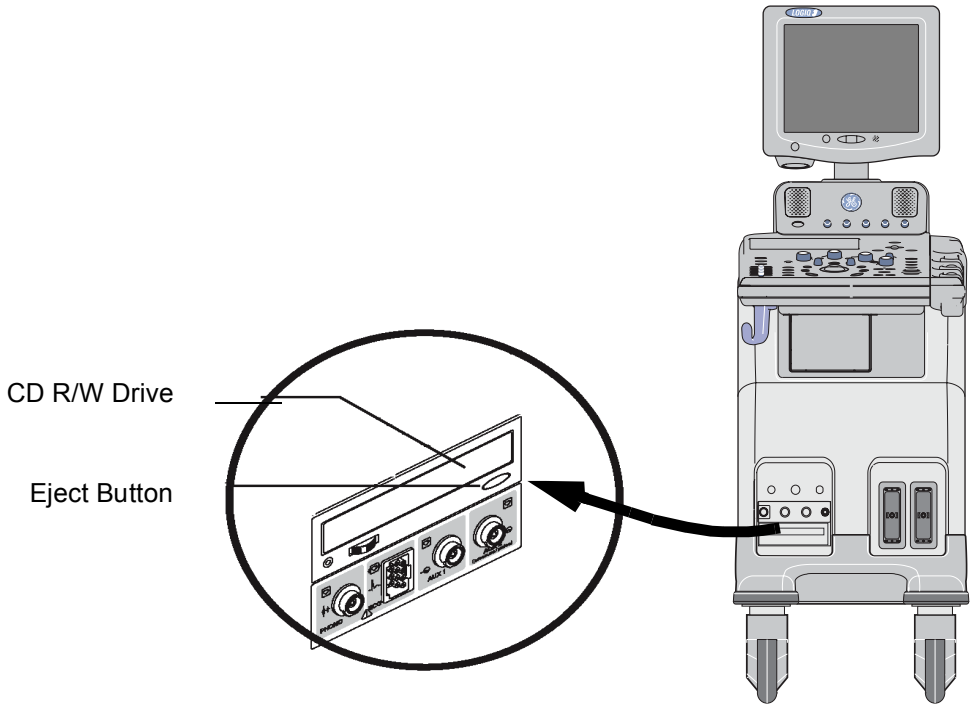


Figure 4-4 CD-RW drives

4-3-2-2 Using MOD (Optional)

NOTE: MOD can be installed through USB Port of LOGIQ™ 3

1.) Before installing an MO disk in the MOD, check the MO disk for loose hardware or damaged labels which could jam inside the MO Drive. Also ensure that the slide switch in one corner of the disk is set so that the disk is write enabled (disk hole closed).

2.) Insert the disk into the MOD with the label facing up.

NOTICE **Never move the unit with a disk in the MOD because the drive actuator will not be locked and the MOD could break.**

3.) The are a number of methods to eject a disk from the MOD. Ejection is automatic in some cases. Manual ejection methods, listed in preferred order of use, are:

a.) Press **EJECT** button on the MOD while system is ON.

b.) Press and hold **EJECT** button while the system is booting.

c.) Mechanical eject. Insert the end of a paper clip into the hole next to the EJECT button while

system power is OFF.

NOTICE **Avoid mechanical ejection whenever possible. Mechanical ejection leaves the actuator unlocked and the MOD susceptible to damage if moved. If forced to use this method, reboot the system, then insert and eject a known good disk using one of the other methods.**

4-3-3 Archiving and Loading Presets

NOTE: Always save presets before any software reload. This ensures the presets loaded after the software reload are as up–to–date as possible.

All user presets except changes to Summary, Anatomy, and Biometry pages, can be saved on an CD-RW/MOD disk for reloading on the system.

⚠ **NOTICE** Presets should NOT be saved on the same CD-RW/MO disk as images. The Archive Menu lists the images but does NOT list the presets stored on a CD-RW/MO disk.

4-3-3-1 Formatting CD(R/W)/MO Disk

1.) Insert an empty (blank) CD(R/W)/MO Disk into the Device Drive.

2.) Press the **UTILITY** Key on the Keyboard and select **Connectivity> TOOLS**. The Tools screen will be shown on the monitor.

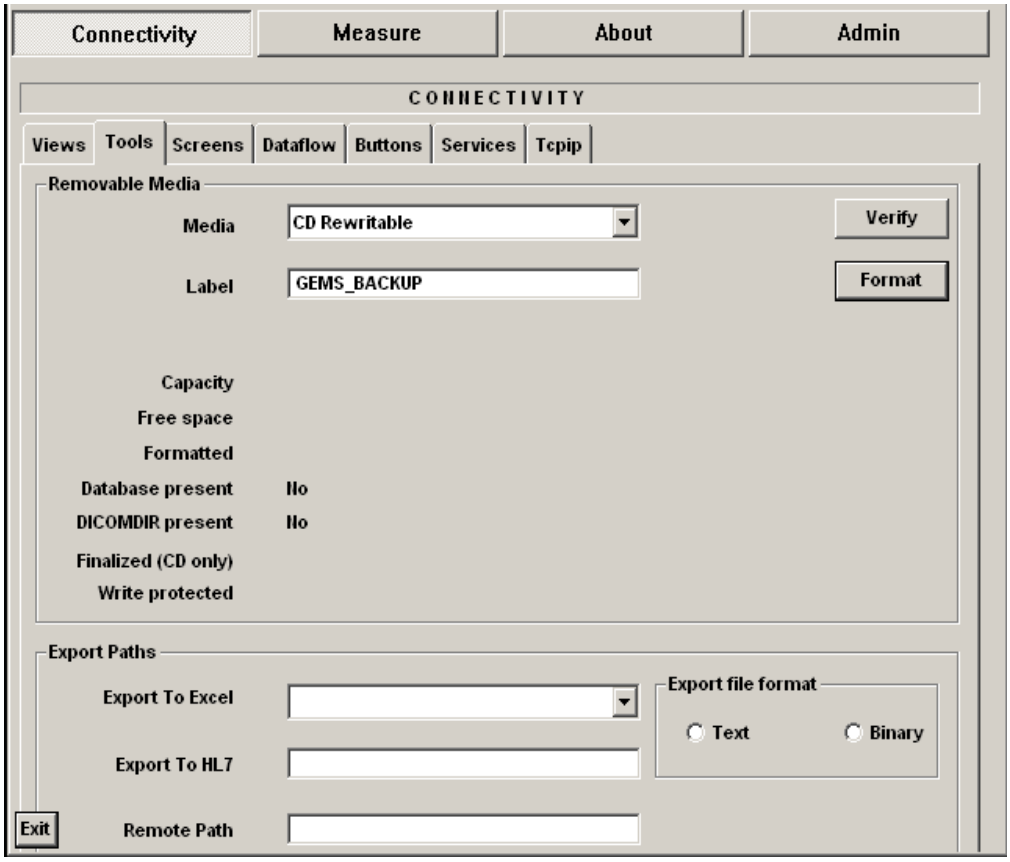


Figure 4-5 Formatting Removable Media

3.) Select the Media from the media list

4.) Type a name for the removable media in label field.

5.) Select **FORMAT** button.

4-3-3-2 Archiving Presets to an CD(R/W)/MO Disk

1.) Insert an empty (blank) formatted CD(R/W)/MO disk into the device drive.

2.) Press the **UTILITY** Key in the Keyboard and Select **System> BACKUP**. The Backup Screen will be shown on the monitor.

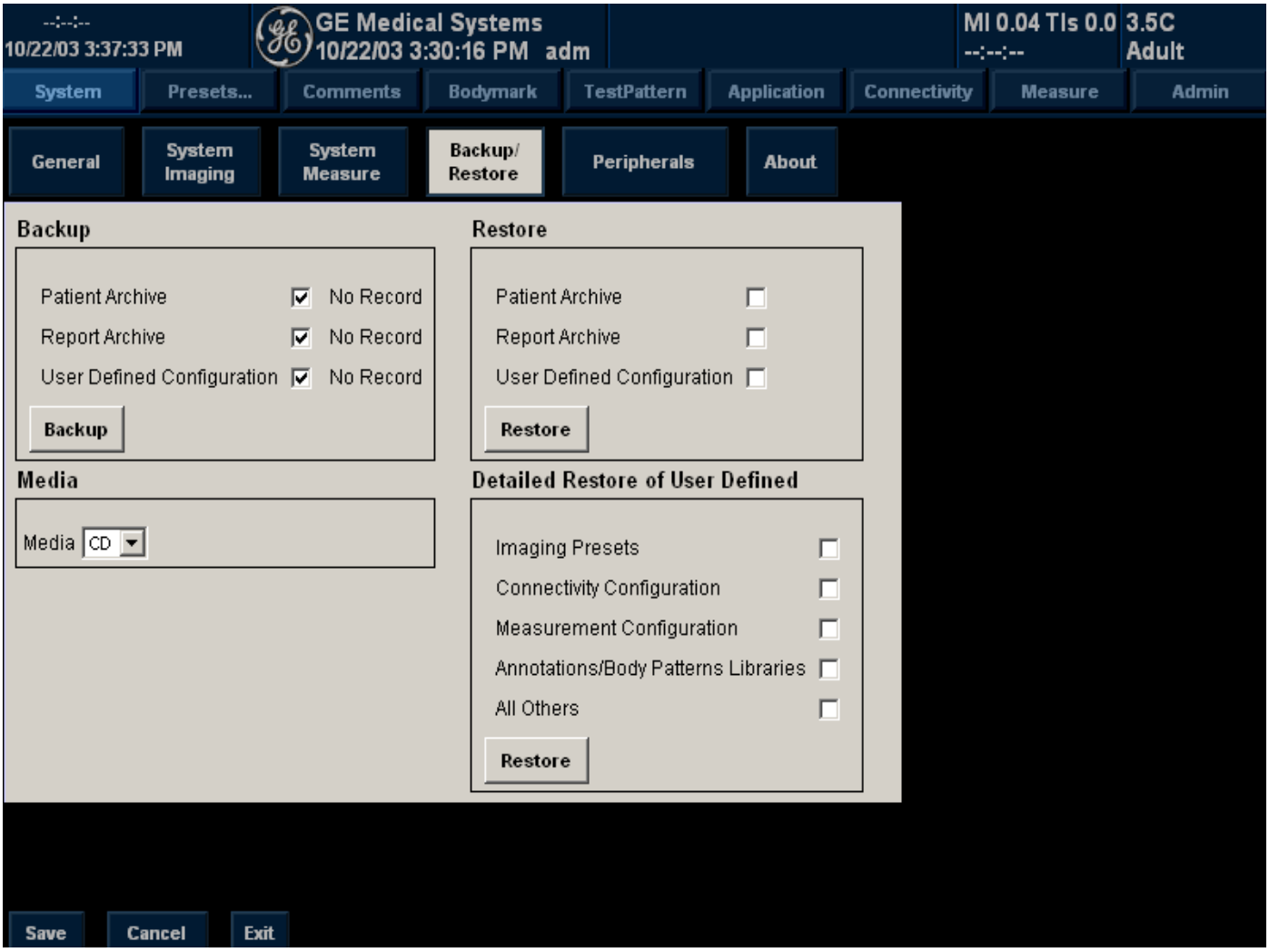


Figure 4-6 Backup Sheet

3.) Select the item to back up either from Resource Files.

4.) Enter backup destination or browse through the disk to locate the destination.

5.) Click on **BACKUP** the backup status for each item is displayed on the Result column.

6.) Make sure “Finished OK” is displayed on the Result column.

4-3-3-3 Loading Presets from an CD(R/W)/MO disk

1.) Insert the CD(R/W)/MO Disk with the archived Presets into the CD(R/W)/MO Disk.

2.) Press the **UTILITY** Key in the Keyboard and Select **System> RESTORE**. The Restore Sheet will be shown on the monitor.

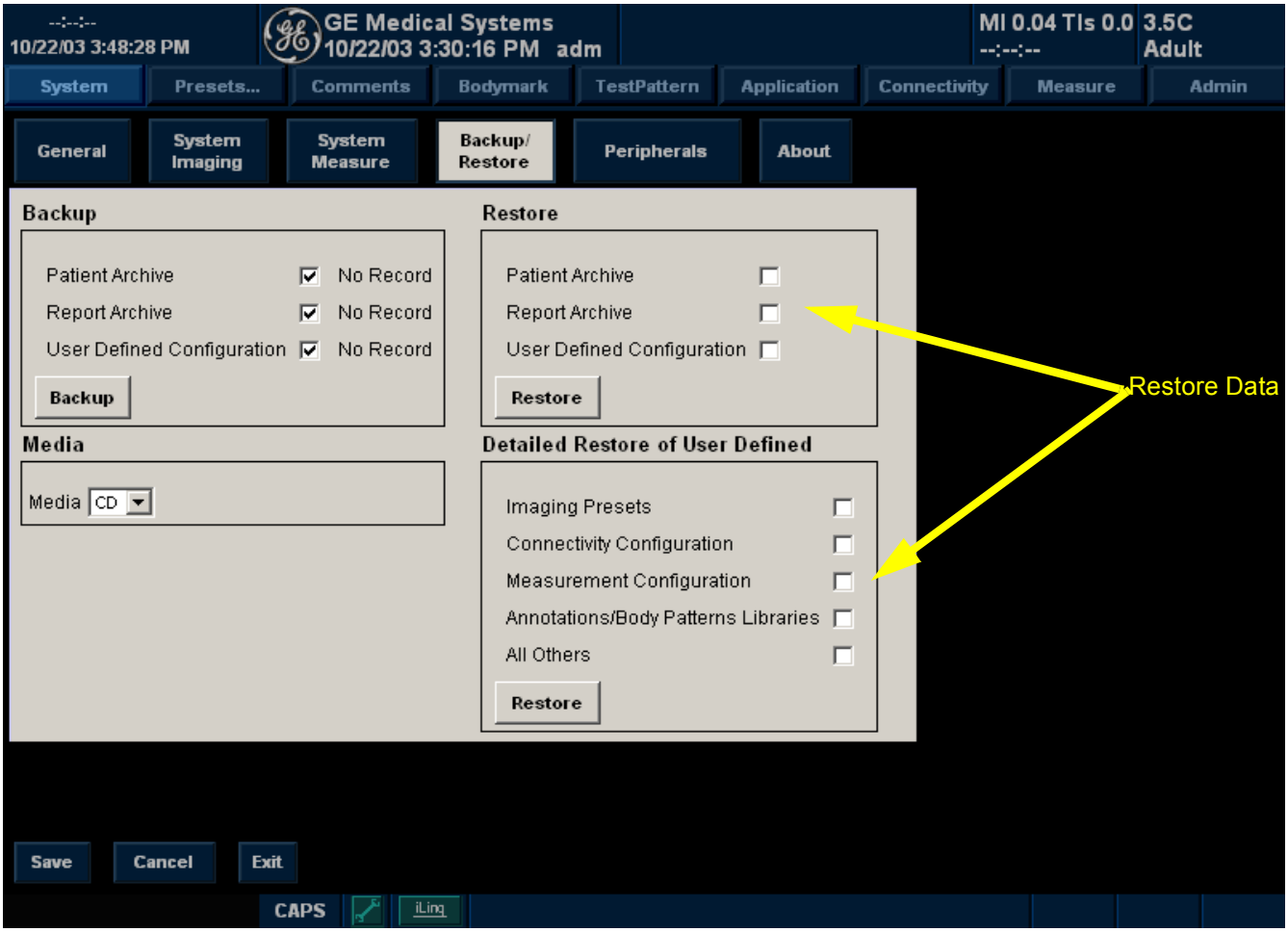


Figure 4-7 Restore Sheet

3.) Select the item to restore either from resource files.

4.) Click on **Restore**. A message to make sure the restore process is displayed on the monitor. Click **OK**. The restore status for each item is displayed on the Result column.

5.) Make sure “Finished OK” is displayed on the result column.

NOTE: This process will restart the System and all selectd Parametrs will be reloaded

4-3-4 Adjusting the Display Monitor

4-3-4-1 Brightness and Contrast

To adjust the brightness:

1.) Press the Center button of the display monitor twice.
2.) Press the Right button to increase brightness.
Press the Left button to decrease brightness.
The amount of brightness is shown on a slider on the screen.

To adjust the contrast:

1.) Press the Center button of the display monitor once.
2.) Press the Right button to increase the contrast.
Press the Left button to increase the contrast.
The amount of the contrast is shown on a slider on the screen.

4-3-4-2 Manual Degauss

To activate the manual degauss:

1.) Press the Center button until menu OSD appears on the screen.
2.) Press the toggle button for brightness and contrast.
3.) Press the Decrease or Increase monitor adjustment button and select degauss now.
4.) Monitor degaussing is done.

4-3-5 Lockout/Tagout Requirements (For USA/Europe Only)

Follow OSHA Lockout/Tagout requirements by ensuring you are in total control of the plug.

NOTICE Lockout/Tagout Requirements (For USA / Europe only)

Follow OSHA Lockout/Tagout requirements by ensuring you are in total control of the Power Cable on the system.

Section 4-4
Functional Checks

4-4-1 Basic Controls

4-4-1-1 Alpha Numeric Keyboard

Table 4-2 Keyboard

Task	Expected Result
Esc	Exit current display screen.
Help (F1)	Enter Online help / User manual.
Word Delete (F10)	Erase word associated with comment cursor.
Arrow (F2)	Annotation arrow.
Grab Last (F9)	Activate the last selected data for edit.
Home/Set Home (F7)	Move annotation cursor to home position; shift+key to set current annotation cursor position as the new home position.
Text1/Text2(F8)	Switch between user text annotation overlays.

4-4-1-2 Keyboard Controls

Table 4-3 Keyboard Controls

Task	Expected Result
Patient	Enter Patient Demographic data screen.
B-Mode (Scan)	Returns machine to scanning state and select scan mode.
Report	Activates default report and touch screen of report choices.
Utility	Activates the machine's configuration.
Application (Probe Indicator)	Indicates the 2 connected probes and selected application

4-4-1-3 Top and Sub Menu

Refer Operator Manual Chapter 4 for more details

4-4-2 B Mode Checks

4-4-2-1 Preparations

1.) Connect one of the probes listed in 3-5-3 Available Probe, in Chapter 3 Installation to the System probe connector.

2.) Turn ON the scanner (if it isn't turned on already))

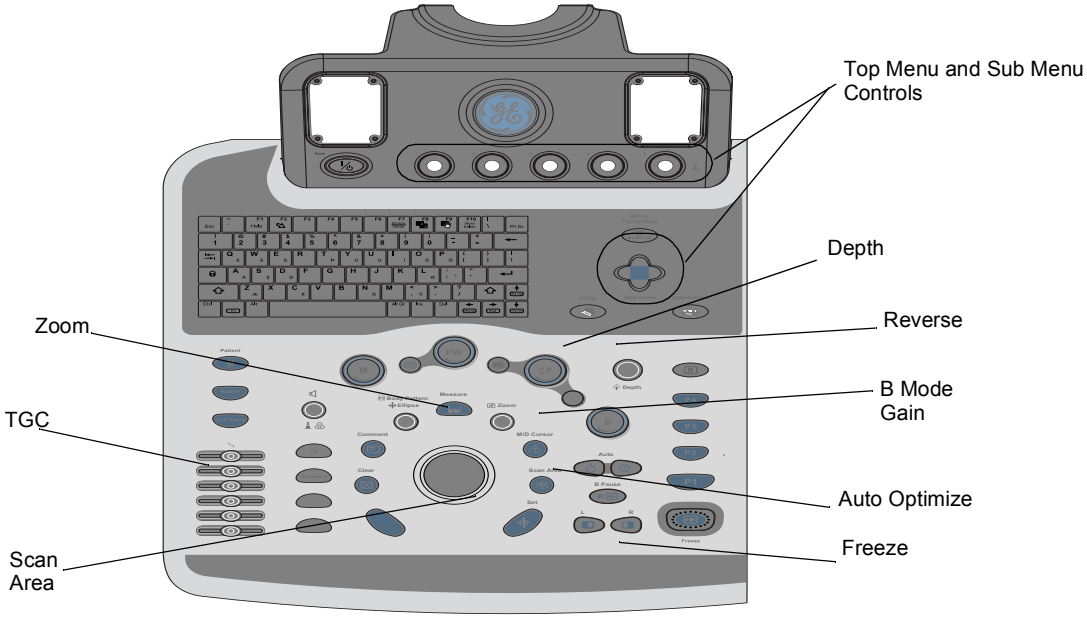


Figure 4-8 LOGIQ™ 3 B Mode Controls

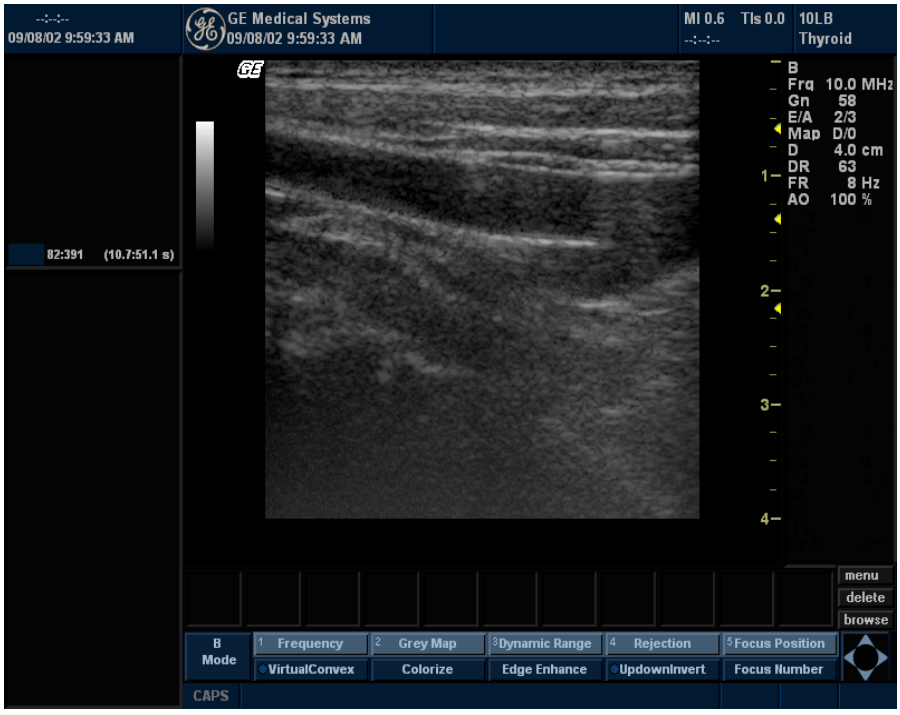


Figure 4-9 B Mode Screen Picture Example

4-4-2-2 B Mode OP Panel Controls

Table 4-4 B Mode Control Panel Controls

Step	Task	Expected Result(s)
1	Press B Mode key	B Mode Starts
2	Adjust Depth	Adjust the field of view. Increasing the depth may view larger/deeper structures rates, and decreasing the depth may view near the skin line.Turn Depth right/left to increase/ decrease. Depth displays on the monitor in cm.
3	Adjust Gain	Controls the amount of echo information displayed in an image. Turn B Mode dial to the left/right to increase/decrease Gain. Gain displays on the monitor in G (dB).
4	Adjust Time Gain Compensation (TGC)	Amplifies the returning signals to correct for the attenuation caused by tissues at increasing depth. TGC slide pots spaced proportional to the depth. Move the slide pots to the left/right to decrease/increase TGC. A TGC curve appears on the display.
5	Adjust Scan Area	Widen or narrow the size of the sector angle to maximize the image's region of interest (ROI). Press Scan Area and move the Trackball to narrow/widen the angle.
6	Activate Auto Optimize	Optimize the image based upon a specified region of interest or anatomy. Press the right Auto control to activate.
7	Adjust Zoom	Changes the location of the focal point(s). A triangular focus marker indicates the depth of the focal point.
8	Reverse	Toggles the left/right orientation of the scan image.
9	Harmonics (Activate Tissue Harmonics)	Diminishes low frequency high amplitude noise and improves imaging. Enhances near field resolution for improved small parts imaging as well as far field penetration. Press Harmonics Key to activate.

4-4-2-3 B Mode Top and Sub menu Controls

Table 4-5 B Mode Top and Sub menu Controls

Step	Task	Expected Result(s)
1	Rejection	Adjust rejection level. When this control is increased, low-level echoes are rejected and appear darker in the B image. Rotate Rejection to left/right to adjust the level. An index number is displayed on the Top Menu to indicate the relative level of rejection.
2	Colorize	Colorize the gray scale image to enhance the eyes' discrimination capability. Rotate the Colorize Knob to cycle through the availabe color maps.
3	Edge Enhance	Enhance the gray scale differences corresponding to the edges of structures. Press and turn Edge Enhance left/right to cycle through the settings.
4	Gray Map	Displays a map window adjacent to the image.Rotate the Gray Map Knob to select the map. The image reflects the map as scrolled through the selections.
5	Frequency	Enables the adjustment of the probe's operating frequency. Rotate Frequency and select desired value. The selected frequency is displayed in the status window.
6	Virtual Convex	Displays larger field of view in the far field. Press the Virtual Convex on Top Menu to activate. This mode is Available only on the Linear Probes
7	Frame Average	Averages frames together and create more pixel, smoother image. Use the Paddle left/right switch to adjust the value. The selected value is displayed on the Sub Menu.
8	Up-Down Invert	Flip the image vertically. Press Up-Down invert to flip up/down.
9	Dynamic Range	Dynamic Range controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast. This Control is available on the Top Menu
10	B Softener	Affects the amount of lateral smoothing. This control is available on the Sub Menu
11	Suppression	Suppress the Noise level.
12	Focus Width	Adjust the Width between two Focus points
13	Power Output	Adjust Power Output Level
14	Focus Position and Number	Increases the number of focal zones or moves the focal zone(s) to tighten up the beam for specific area. Press the control to toggle between Focus Position and Focus Number. Turn Focus Position left/ right to move the Focus. Press and Turn the Knob to adjust the focal numbers.
15	Biopsy	Biopsy guidelines appears.
16	Line Density	Optimizes B-Mode frame rate or spatial resolution.

4-4-3 M Mode Controls

4-4-3-1 Preparations

1.) Connect one of the probes listed in 3-5-3 Available Probe, in Chapter 3 Installation to the System probe connector.

2.) Turn ON the scanner (if it isn't turned on already

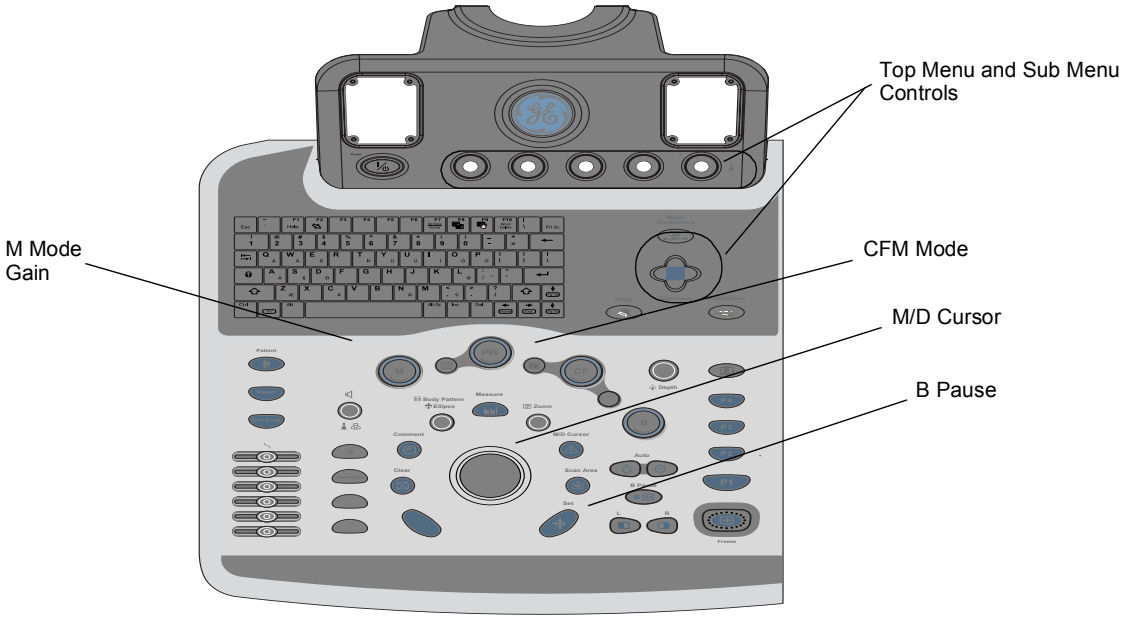


Figure 4-10 Controls available in M Mode

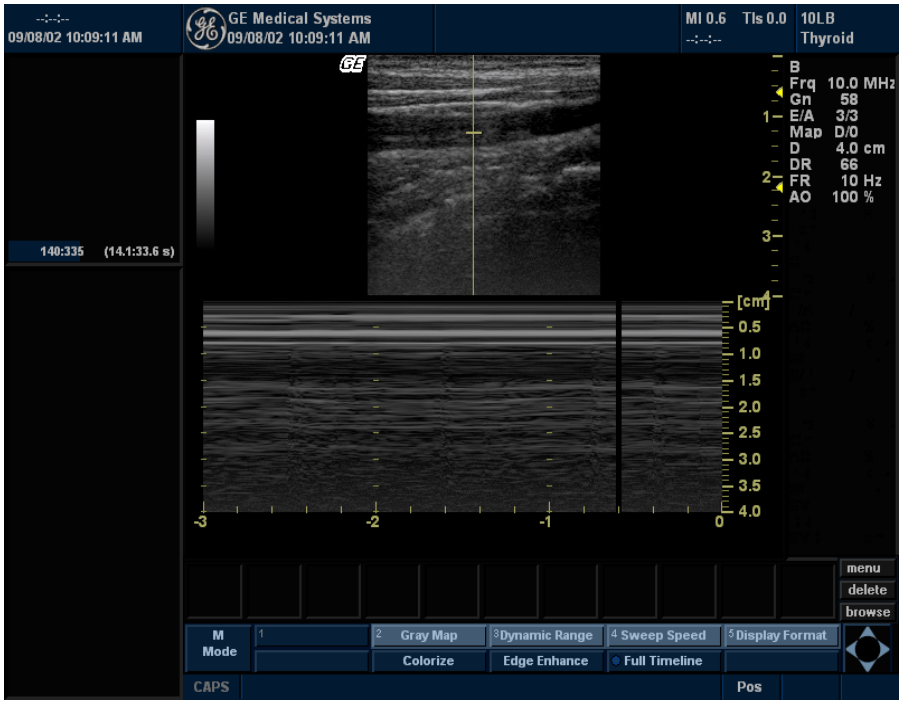


Figure 4-11 M Mode Screen Picture Example

4-4-3-2 M Mode OP Panel Controls

Table 4-6 M Mode OP Panel Controls

Step	Task	Expected Result(s)
1	Press M Mode key	M Mode Starts
2	Adjust Gain	Controls the amount of echo information displayed in an image. Turn M Mode dial to the left/right to increase/decrease Gain. Gain displays on the monitor in G (dB).
3	Display M-Mode Cursor	Displays the M-Mode cursor on the B-Mode image. Press M/D Cursor and Trackball to position M-Mode Cursor.
4	B Pause	Toggle between simultaneous and update presentation while viewing the M-Mode trace or Spectral Doppler. Press B Pause to toggle between simultaneous and update.
5	Activate M Color Flow Mode	Overlays color on the M-Mode image using velocity and variance color maps. Press M, then CFM Mode key (or vice versa) to activate.

4-4-3-3 M Mode Top and Sub menu Controls

Table 4-7 M Mode Top and Sub Menu Controls

Step	Task	Expected Result(s)
1	Rejection	Adjust rejection level. When this control is increased, low-level echoes are rejected and appear darker in the M image. Use Paddle left/right key to adjust Rejection level. An index number is displayed in the status window to indicate the relative level of rejection.
2	Sweep Speed	Changes the speed at which timeline is swept. Rotate Sweep Speed left/right to increase/decrease the value.
3	Edge Enhance	Enhance the gray scale differences corresponding to the edges of structures. Press and Rotate Edge Enhance left/right to cycle through the settings.
4	Gray Map	Displays a map window adjacent to the image. Rotate the Gray Map knob. The image reflects the map as scrolled through the selections.
5	Power Output	Adjust Power output level.
6	Colorize	Colorize the gray scale image to enhance the eyes' discrimination capability. Press and Rotqte the Colorize knob to select the appropriate color map.
7	Full Timeline	Displays only timeline screen. Press the Full Time line to activate.
8	Display Format	Select the format to display B image and M image on the monitor. Rotate Display Format knob and select from the Top Menu.
9	Dynamic Range	Enables control of the dynamic range or contrast of the image. When dynamic range is set high, the image is softer and more low-level data is visible. Turn Dynamic Range rotation knob left/right to increase/decrease the value.

4-4-4 Color Flow Mode Checks

4-4-4-1 Preparations

1.) Connect one of the probes listed in 3-5-3 Available Probe, in Chapter 3 Installation to the System probe connector.

2.) Turn ON the scanner (if it isn't turned on already

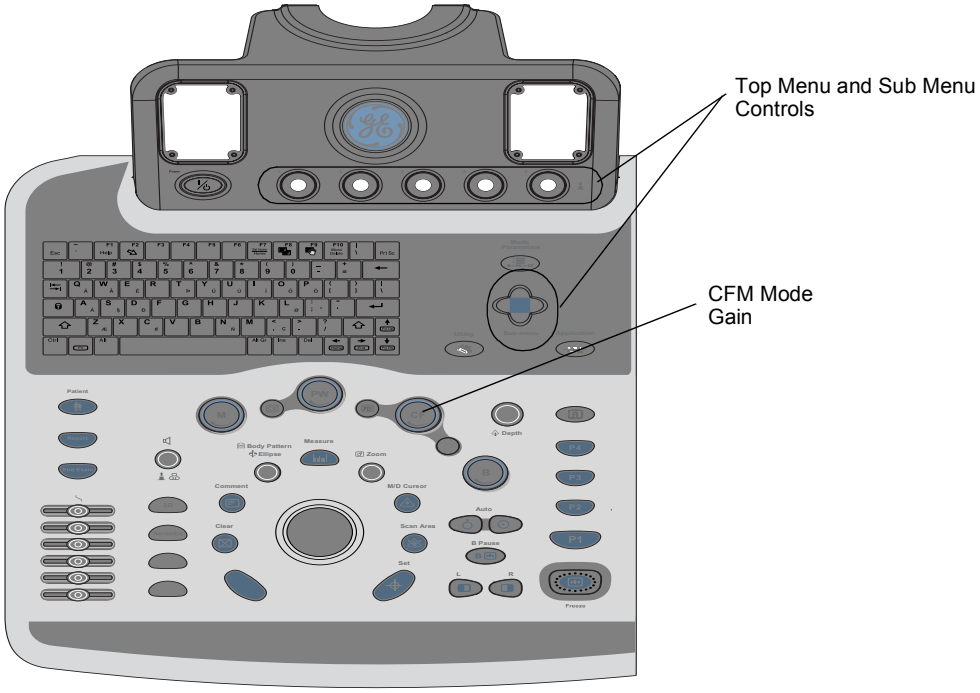


Figure 4-12 Controls available in Color Flow Mode

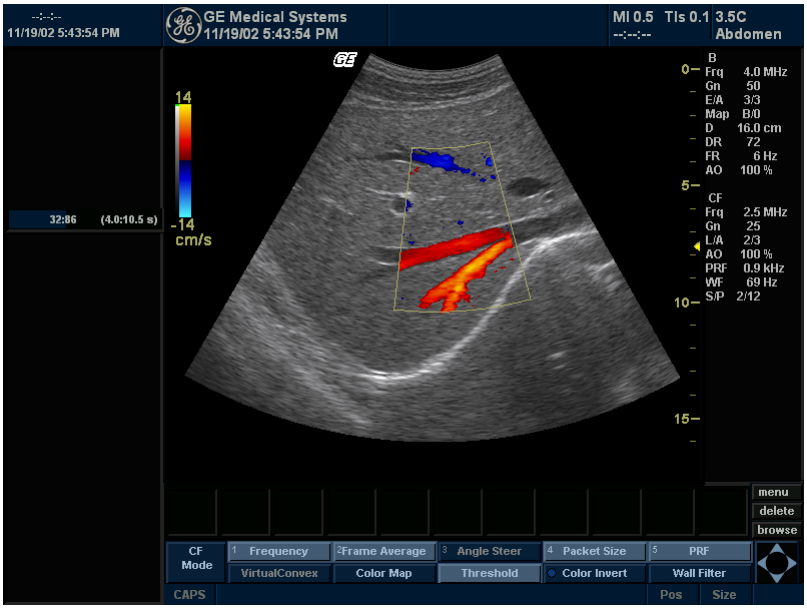


Figure 4-13 CFM Mode Screen Picture Example

4-4-4-2 Color Flow Mode OP Panel Controls

Table 4-8 Color Flow Mode OP Panel Controls

Step	Task	Expected Result(s)
1	Press CFM-Mode key	CFM Mode Starts
2	Adjust Gain	Amplifies the overall strength of the echoes processed in the Color Flow window. Turn the Gain dial (CFM Mode key) to the left/right to increase/decrease Gain.

4-4-4-3 Color Flow Mode Top and Sub Menu Controls

Table 4-9 Color Flow Mode Top and Sub Menu Controls

Step	Task	Expected Result(s)
1	Threshold	Assigns the gray scale level at which color information stops. Rotate Threshold Knob left/right to increase/decrease the gray scale threshold.
2	Packet Size	Controls the number of samples gathered for a single color flow vector. Rotate Packet Size left/right to increase/decrease the packet size.
3	Color maps	Selects a specific color map. Rotate Color Map left/right to cycle through available maps.
4	Frequency	Enables the adjustment of the probe's operating frequency. Press Frequency and select desired value. The selected frequency is displayed in the status window.
5	Set Frame Average	Averages color frames. Rotate Frame Average left/right to smooth temporal averaging. The selected value displays on the Top and Sub Menu.
6	Color Invert	Views blood flow from a different perspective. Press Invert to reverse the color map.
7	Virtual Convex	The Region of Interest gets enlarged, covering more image area. This is available only in Linear Probes.
8	Spatial Filter	Activates Spatial Filter
9	Dynamic Range	Enables control of the dynamic range or contrast of the image. When dynamic range is set high, the image is softer and more low-level data is visible. Turn Dynamic Range rotation knob left/right to increase/decrease the value.
10	ACE	Eliminates the motion artifacts. Press Ace on the Sub Menu to activate.
11	Angle Steer	Slant the Color Flow linear image left or right to get more information without moving probes. Click Angle Steer to the left/right to slant the linear image.
12	Baseline	Changes the spectrum baseline to accommodate higher velocity blood flow. Rotate Baseline left/right to adjust the baseline.
13	PRF / Wall Filter	Velocity scale determines pulse repetition frequency. If the sample volume gate range exceeds single gate PRF capability, the system automatically switches to high PRF mode indicated by Multiple gates.
14	Transparency Map	Activates Transparency Map.

4-4-5 Doppler Mode Checks

4-4-5-1 Preparations

1.) Connect one of the probes listed in 3-5-3 Available Probe, in Chapter 3 Installation to the System probe connector.

2.) Turn ON the scanner (if it isn't turned on already

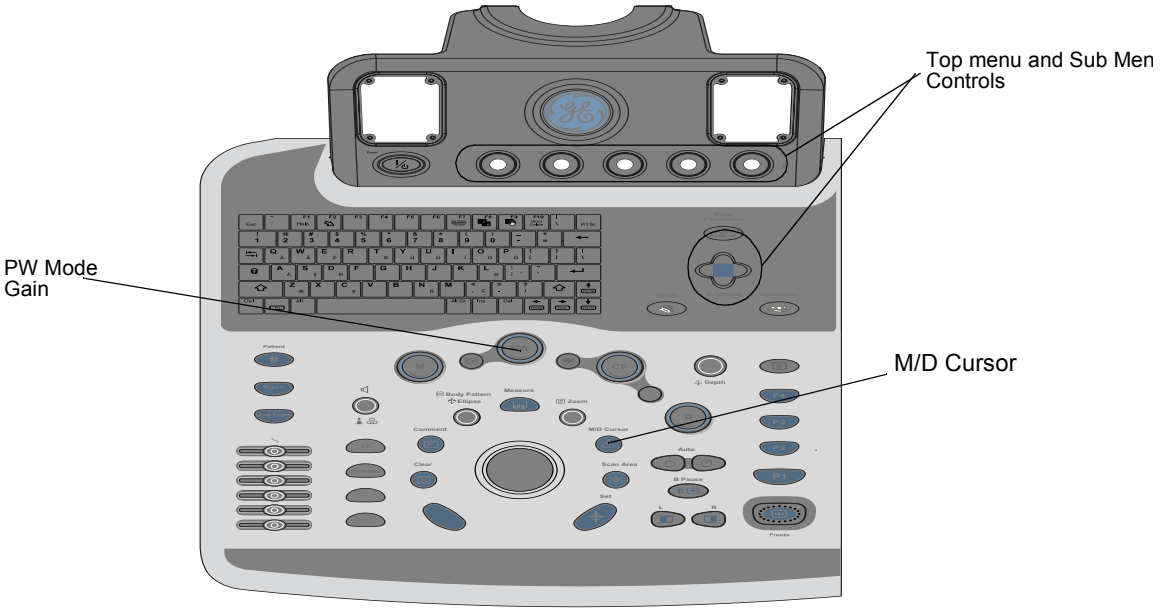


Figure 4-14 Controls available in Doppler Mode

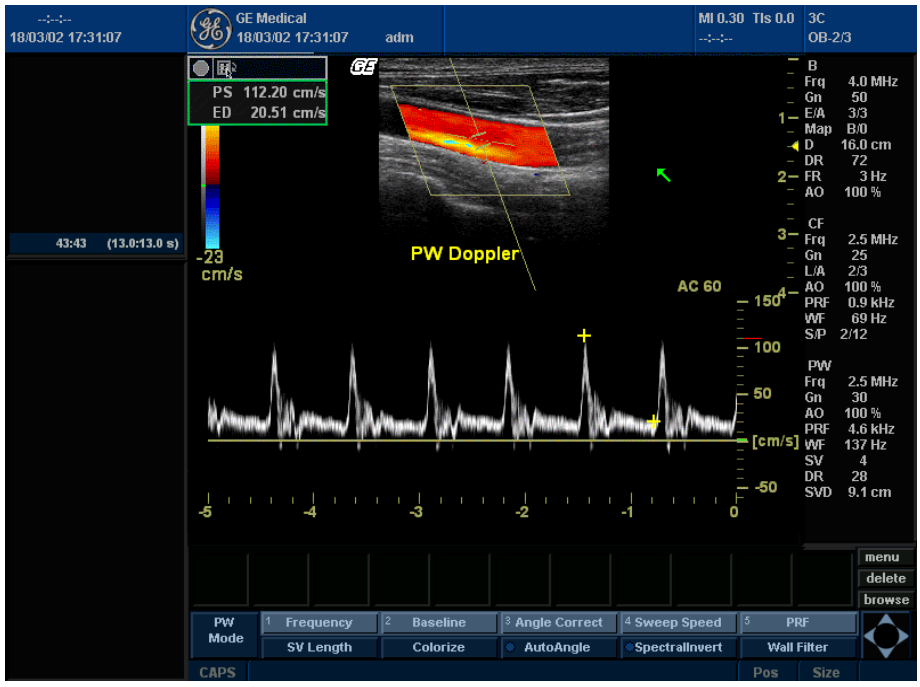


Figure 4-15 Doppler Mode Screen Picture Example

4-4-5-2 Doppler Mode OP Panel Controls

Table 4-10 Doppler Mode OP Panel Controls

Step	Task	Expected Result(s)
1	Press PW Mode key	PW Mode Starts
2	Adjust Gain	Amplifies the overall strength of the echoes processed in the Color Flow window. Turn the Gain dial (PW Mode key) to the left/right to increase/decrease Gain.
3	Display M/D-Mode Cursor	Displays the M/D-Mode cursor on the B-Mode image. Press Cursor and Trackball to position sample volume graphic. Rotate SV gate to adjust sample volume gate size.
4	Audio Volume	Controls Doppler audio output. Turn Volume left/right to adjust PW Doppler audio.

4-4-5-3 Doppler Mode Top and Sub Menu Controls

Table 4-11 Doppler Mode Top and Sub Menu Controls

Step	Task	Expected Result(s)
1	Rejection	Adjust rejection level. When this control is increased, low-level echoes are rejected and appear darker in the PW image. Press Rejection Paddle left/right keys to adjust the level.
2	Sweep Speed	Changes the speed at which timeline is swept. Rotate left/right to increase/decrease the value.
3	Full Timeline	Displays only timeline screen. Press the Full Time in the Sub-menu screen to activate.
4	Display Format	Select the format to display B image and PW image on the monitor. Press Paddle switch and select from the Top Menu
5	Frequency	Enables the adjustment of the probe's operating frequency. Press Frequency and select desired value. The selected frequency is displayed in the status window.
6	Angle Correct	Optimizes the accuracy of the flow velocity. Rotate left/right to adjust the angle relative to the probe face
7	Spectral Invert	Vertically inverts the spectral trace without affecting the baseline position. Press invert to invert the spectral trace. The Plus and Minus signs on the velocity scale reverse when the spectrum is inverted.
8	Sample Volume Length	Sizes the sample volume gate.Rotate SV lenght Knob to resize gate.
9	Spectral Average	Activates Spectral Average.
10	Duplex / Triplex	Activates Duplex/Triplex Mode of operation
11	Color Map	Colorize the gray scale image to enhance the eyes' discrimination capability. Select the Color Map on the sub menu and select the approporiate map.
12	Trace Direction / Method	Provides automatic Trace of the Spectrum above and/or below the base line.
13	Dynamic Range	Controls how echo intensities are converted to shades of gray. Click Dynamic Range Paddle key to increase/decrease the value.
14	Auto Calculations	Activates Auto Calculations of the Measurements
15	Adjust Angle Steer	Slant the Color Flow linear image left or right to get more information without moving probes.Rotate Angle Steer to the left/right to slant the linear image.
16	Move Baseline	Adjusts the baseline to accommodate faster or slower blood flows to eliminate aliasing. Rotate Baseline left/ right to shift the baseline.
17	PRF / Wall Filter	Adjust the velocity scale to accommodate faster/slower blood flow velocities. Rotate PRF left/right to select values
18	Trace Sensitivity	Activates Trace Sensitivity.

4-4-6 Measurement and Multi Image Checks

4-4-6-1 Performing B Mode Measurements Checks

Figure 4-16 Measurement Keys

Table 4-12 Measurement Checks

Step	Task	Expected Result(s)
1.	Generate the B image.	A B image is active on the screen
2.	Press Freeze	Freeze the image to measure.
3.	Press **MEASURE** on the Control Panel to enter the Assign and Measure modality.	The measurement soft menu for the current exam category is displayed on the Monitor. Select the appropriate exam category and measurement kind.
5.	**Trackball** the cursor	Move the cursor to the start point of the measurement
6.	Press **Set**.	Anchor the start point of the measurement.
7.	Trackball the cursor	Move the cursor to the measurement end point.The current distance value is displayed in the *Measurement result table* and is instantaneously updated when moving the cursor

4-4-7 Basic Measurements

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

4-4-7-1 Distance and Tissue Depth Measurements

1.) Press **MEASURE** once; an active caliper displays.
2.) To position the active caliper at the start point (distance) or the most anterior point (tissue depth), move the **TRACKBALL**.
3.) To fix the start point, press ***Set***. The system fixes the first caliper and displays a second active caliper.
4.) To position the second active caliper at the end point (distance) or the most posterior point (tissue depth), move the **TRACKBALL**.
5.) To complete the measurement, press **SET**. The system displays the distance or tissue depth value in the measurement results window.

Before you complete a measurement:

To toggle between active calipers, press **MEASURE**.

To erase the second caliper and the current data measured and start the measurement again, press **CLEAR** once.

NOTE: To rotate through and activate previously fixed calipers, turn **CURSOR SELECT***.*

NOTE: After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **CLEAR***.*

4-4-7-2 Circumference/Area (Ellipse) Measurement

1.) Press **MEASURE** once; an active caliper displays.
2.) To position the active caliper, move the **TRACKBALL**.
3.) To fix the start point, press **SET**. The system fixes the first caliper and displays a second active caliper.
4.) To position the second caliper, move the **TRACKBALL**.
5.) Turn the **ELLIPSE** control; an ellipse with an initial circle shape appears.

4-4-7-2 Circumference/Area (Ellipse) Measurement (cont'd)

NOTE: Be careful not to press the Ellipse control as this activates the Body Pattern.

6.) To position the ellipse and to size the measured axes (move the calipers), move the **TRACKBALL**.

7.) To increase the size, turn the **ELLIPSE** control in a clockwise direction. To decrease the size, turn the **ELLIPSE** control in a counterclockwise direction.

8.) To toggle between active calipers, press **MEASURE**.

9.) To complete the measurement, press **SET**. The system displays the circumference and area in the measurement results window.

Before you complete a measurement:

- To erase the ellipse and the current data measured, press **CLEAR** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **CLEAR** a second time.

4-4-7-3 Worksheets

Measurement/Calculation worksheets are available to display and edit measurements and calculations. There are generic worksheets as well as Application specific worksheets. The worksheets are selected from the Measurement Menu.

4-4-7-4 Report Pages

Measurements/Calculations that are included on the worksheet can also be displayed on Report Pages.

NOTE: This Feature is not yet fully functional on the LOGIQ™ 3

4-4-8 Probe/Connectors Usage

4-4-8-1 Connecting a probe

1.) Place the probe's carrying case on a stable surface and open the case.

2.) Carefully remove the probe and unwrap the probe cable.

3.) DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage.

4.) Turn the connector locking handle counterclockwise.

5.) Align the connector with the probe port and carefully push into place.

6.) Turn the connector locking handle clockwise to secure the probe connector.

7.) Carefully position the probe cable in the probe cord holder spot so it is free to move, but not resting on the floor.

4-4-8-2 Activating the probe

Select the appropriate probe from the probe indicators on the NTPUI.

The probe activates in the currently-selected operating mode. The probe's default settings for the mode and selected exam are used automatically.

4-4-8-3 Deactivating the probe

When deactivating the probe, the probe is automatically placed in standby mode.

1.) Press the ***Freeze*** key.
2.) Gently wipe the excess gel from the face of the probe. (Refer to the Basic User Manual for complete probe cleaning instructions.)
3.) Carefully slide the probe around the right side of the keyboard, toward the probe holder. Ensure that the probe is placed gently in the probe holder.

4-4-8-4 Disconnecting the probe

Probes can be disconnected at any time. However, the probe should not be selected as the active probe.

1.) Move the probe locking handle counterclockwise. Pull the probe and connector straight out of the probe port.
2.) Carefully slide the probe and connector away from the probe port and around the right side of the keyboard. Ensure the cable is free.
3.) Be sure that the probe head is clean before placing the probe in its storage box.

4-4-9 Using Cine

4-4-9-1 Activating CINE

Press **FREEZE**, then roll the **TRACKBALL** to activate CINE. To start CINE Loop playback, press Run/Stop. To stop CINE Loop playback. press Run/Stop.

4-4-9-2 Quickly Move to Start/End Frame

Press FIRST to move to the first CINE frame; press LAST to move to the last CINE frame.

4-4-9-3 Start Frame/End Frame

Turn the **START FRAME** dial to the left to move to the beginning of the CINE Loop. Turn the dial to the right to move forward through the CINE Loop.

Turn the **END FRAME** dial to the right to move to the end of the CINE Loop. Turn the dial to the left to move backward through the CINE Loop.

4-4-9-4 Adjusting the CINE Loop Playback Speed

Turn the **LOOP SPEED** dial right/left to increase/decrease the CINE Loop playback speed.

4-4-9-5 Moving through a CINE Loop Frame By Frame

Turn **FRAME BY FRAME** to move through CINE memory one frame at a time.

4-4-10 Image Management (QG)

For Image Management functionality refer to the LOGIQ™ 3 Quick Guide. It talks about several topics:

- Clipboard
- Printing Images
- Browsing and Managing an Exam's Stored Image
- Connectivity, and Dataflow Concept and Creation
- Starting an Exam
- Configuring Connectivity
- TCP/IP
- Services (Destinations)
- Buttons
- Views
- Verifying and Pinging a Device

4-4-11 Back End Processor Checks

If all the previous tests have been passed successfully, the backend processor is most likely OK. If the system seems to be operating erratically, Please refer to Chapter7, Diagnostic/Troubleshooting.

Section 4-5
Software Configuration Checks

Table 4-13 Software Configuration Checks

Step	Task to do	Expected Result(s)	
1.	Check Date and Time setting	Date and Time are correct	Adjust the Date and Time setting
2.	Check that Location (Hospital Name and Department) is correct	Location Name is correct	Re-enter the correct Location Name
3.	Check Language setting	Language is proper	Set the proper Language
4.	Check Units setting	Units are proper	Set the local units
5	Check assignment of Printer Keys	Print1-4 Keys are assigned as desired by the customer	
6	Check that all of the customer's options are set up correct	All authorized functions are enabled	

Section 4-6
Peripheral Checks

Check that peripherals work as described below:

Table 4-14 Peripheral checks

Step	Task to do	Expected Result(s)
1.	Press(**FREEZE**)	Stop image acquisition.
2.	Press (**PRINT 1**) or (**PRINT 4**) on the Control panel	The image displayed on the screen is printed on B&W or Color printer, depending on the key assignment configuration.
3.	Press **VIDEO** on the Control Panel.	To start the video counter at a different point:
4.	Press **VIDEO** or **B MODE** on the Control Panel	to return to the scanning mode
5.	Press **REC/PAUSE** on the *Control panel*.	to Start Recording A red dot is displayed in the *VCR status area* on the *Title bar* to indicate that recording has begun
6.	Press **REC/PAUSE** on the *Control panel*.	To Stop recording The video status icon is changed to (Pause)
7.	Press VIDEO on the Control Panel. and the assignable play	To start Play back an examination
8.	Use the **Assignable keys** on the *Control panel*	to perform actions on the recorded session, such as stop, pause, rewind or fast forward. The video status icon in updated accordingly.
9.	While in playback mode, use the **TRACKBALL** to adjust the video playback speed and scroll through the record.	To search on the tape
10.	Press the assignable **PAUSE**	to stop the tape at the desired frame.
11.	When playing back an examination	part of it can be stored on the computer's memory as a cineloop.The cineloop enables the user to perform further operations on the stored section (see for further information on cineloop operation).
12.	Press (**FREEZE**) while playing back a recorded session.	**To store a recorded sequence as a cineloop.** The last few seconds are stored as a cineloop.

Section 4-7
Safety Issues

4-7-1 Probe/Connectors Check

Take the probes and check them as described below:

Table 4-15 Probe and connectors check

Step	Task to do	Expected Result(s)
1.	Test Each delivered Probe	it will display pictorial data on the screen
2.	Test each probe in each connector slot	It will display pictorial data each time
3.	Hold the probe connector vertically with the cable pointing upward. Turn the connector locking handle to the horizontal position. Align the connector with the probe port and carefully push into place. Rotate the locking handle to the full vertical position to lock in place. Position the probe cable so that it is not resting on the floor CAUTION: Do not allow the probe head to hang freely. Impact to the probe head may result in irrepairable damage.	To connect a probe:
4.	Select the appropriate probe key on the Application Menu to activate the probe. Key Light Indicators: - on the Probe Off - no probe attached to probe port. On: normal intensity - probe attaches to the probe port but not active. On: high intensity - probe attached to the probe port and active. The probe activated in the currently selected operating mode. Previously Selected Application and Preseta are retained.	To select a probe and an application:
5.	Rotate the lock handle counter-clockwise to the horizontal position to unlock the connector. Remove the connector from the port Ensure that the probe head is clean before placing the probe in its storage case.	To disconnect probes: The probes that are not connected to the unit should be stored in their storage case.

WARNING ***Probes can be connected at any time, whether the unit is on or off***

Do NOT touch the patient and any of the connectors on the ultrasound unit simultaneously, including ultrasound probe connectors.

WARNING ***Take the following precautions with the probe cables: Keep free from the wheels. Do not bend.Do not cross cables between probes.***

4-7-2 Power Supply Adjustment

There are no adjustments on the power supplies. The DC Power is self-regulated. If a voltage is outside the specified range, it means that something is wrong, either with the power supply itself or with a component connected to that specific power outlet.

Section 4-8
Site Log

Table 4-16 Site Log

Date	Service person	Problem	Comments

Chapter 5
Components and Functions (Theory)

Section 5-1
Overview

5-1-1 Purpose of Chapter 5

This chapter explains LOGIQ™ 3's system concepts, component arrangement, and subsystem function. It also describes the Power Distribution System (PDS) and probes.

Table 5-1 Contents in Chapter 5

Section	Description	Page Number
5-1	Overview	5-1
5-2	Block Diagrams and Theory	5-4
•	Top Console	5-9
5-3	External I/O on the Rear Panel	5-10
5-4	Peripherals	5-10
5-5	Power Diagrams	5-13
5-6	Circuit Boards Descriptions	5-16
5-7	Mechanical Descriptions	5-28
5-8	Air Flow Control	5-29
5-9	Common Service Platform	5-30

5-1-2 General Information

- LOGIQ™ 3 is a phased and linear array ultrasound imaging scanner. It has provisions for analog input sources like ECG and phono.
- The system can be used for:
  - 2D Black-and-White imaging
  - 2D Color Flow
  - M-Mode Black-and-White imaging
  - Color M-Mode
  - Pulse Doppler
  - Different combinations of the above modes
- LOGIQ™ 3 is a 192 channel digital beam forming unfolded system that can handle up to 128 element linear probes. It uses analog and digital delay to focus the beam. The analog delay is short and fixed. The digital delay is used for long delay and dynamic focus. This system also features many advanced image processing controls.
- Signal flow travels from the Probe Connector Panel to the Front End, to the Mid Processors and Back-End Processor, and finally to the monitor and peripherals.
- System configuration is stored on a hard disk and all necessary software is loaded from the hard disk on power up.

5-1-3 System Features

The key design goals of this system are:

- High Image Quality
- Increased User Productivity
- Multiple Clinical Applications
- Planned Upgrade ability
- High Mobility

5-1-4 Types of Applications

The LOGIQ™ 3 is a general imaging system which supports many clinical uses. Scan and display parameters may be user selected to default to desired values for each application. The system presets many parameters to clinically determined, optimal values.

- Radiology
- Cardiology
- OB/GYN
- Vascular

The LOGIQ™ 3 system can be divided into an analog signal processing section, a digital signal processing section, and the microprocessor driven system control section, which controls the system based on operator commands and system status information.

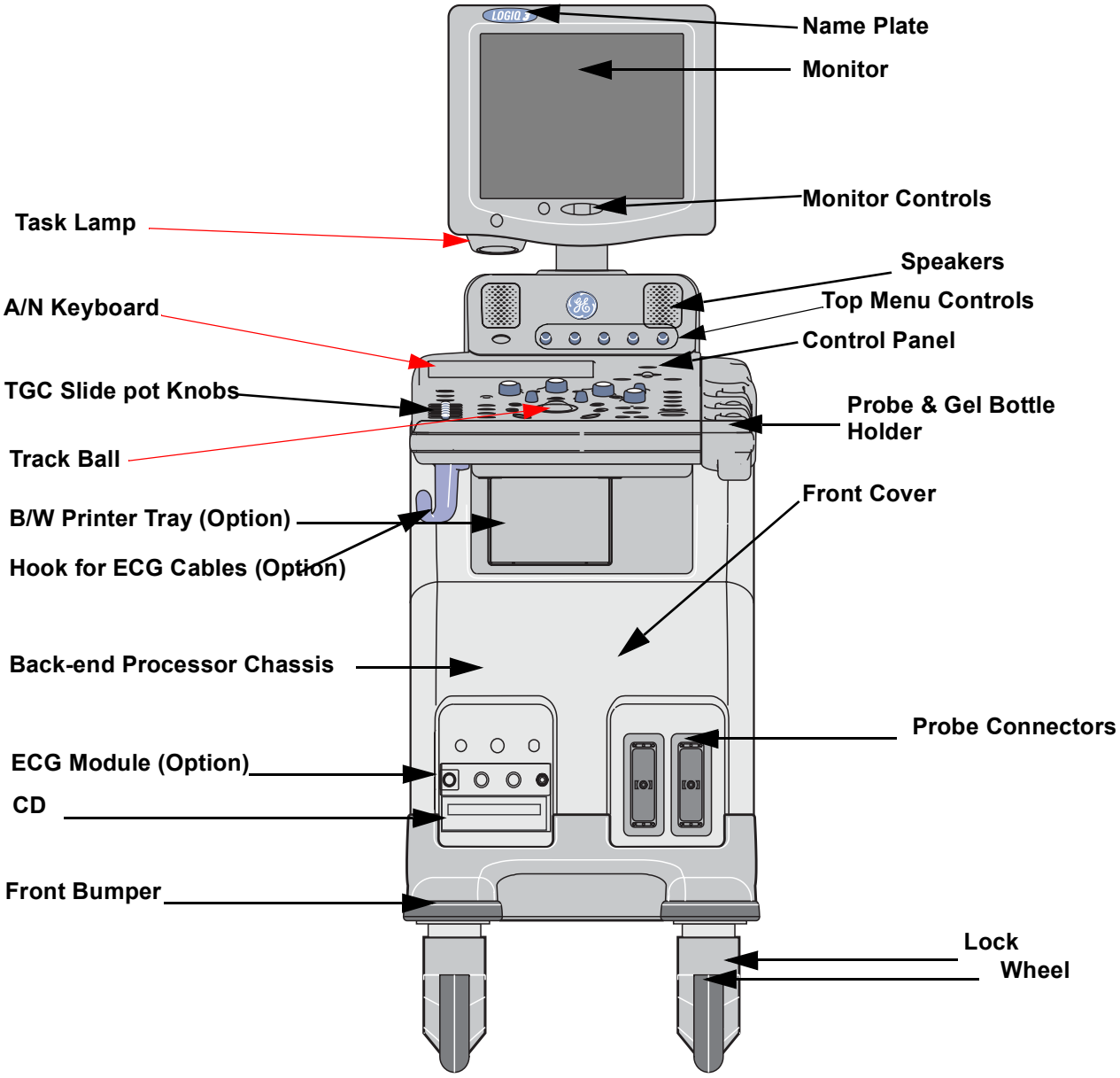


Figure 5-1 LOGIQ™ 3 Major Components

Section 5-2
Block Diagrams and Theory

5-2-1 Block Diagram

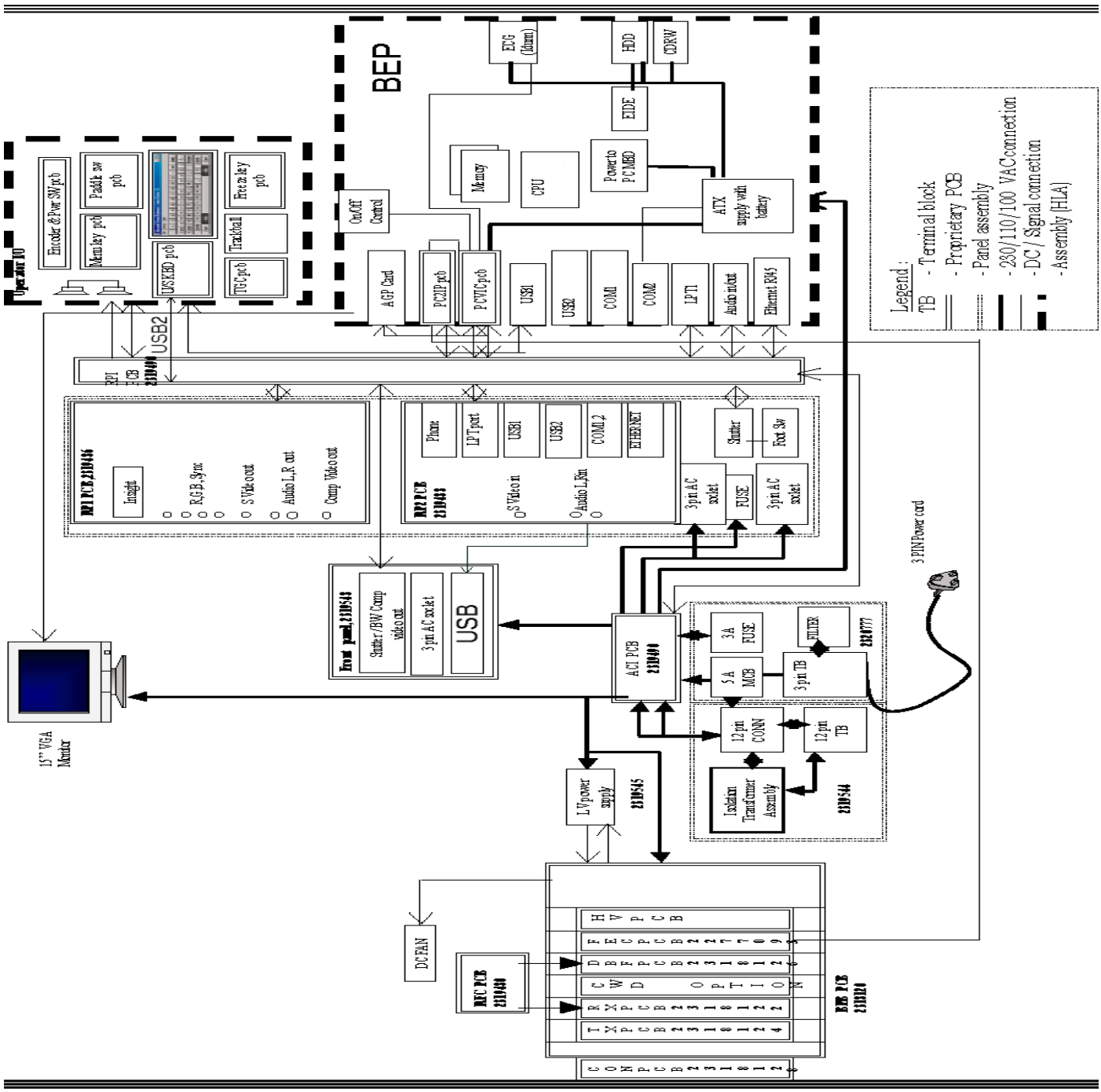


Figure 5-2 LOGIQ™ 3 Block Diagram

5-2-2 Front End

The Front End Consists of Conn. Board, Transmit Board, Receive Board & Digital Beam Former.

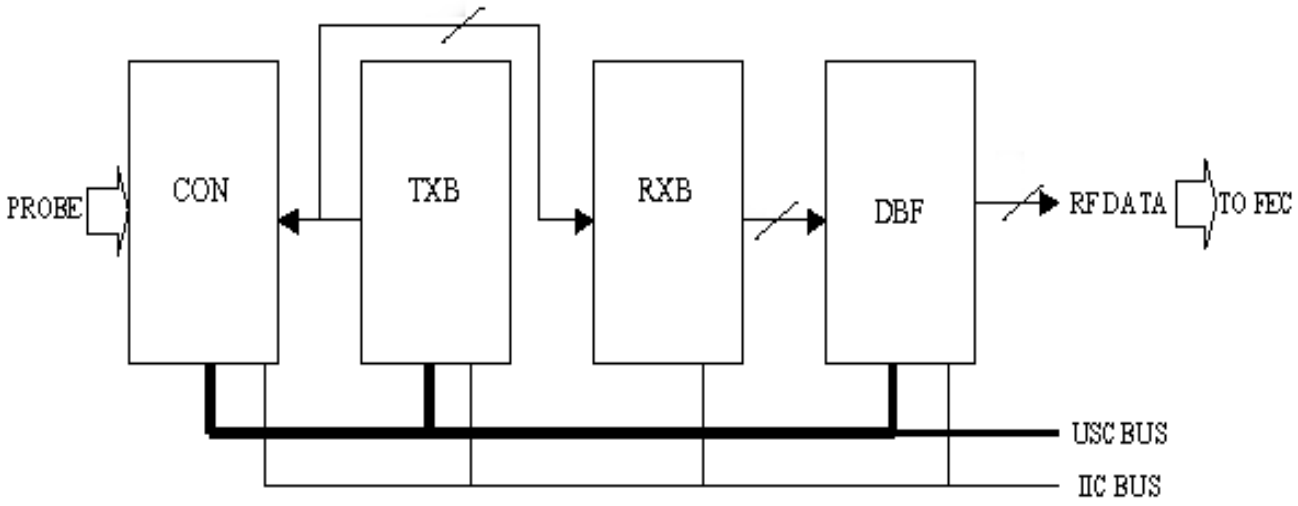


Figure 5-3 The Front End

The Front End generates electrical signals which are transmitted by the probes as ultrasound into the body. It also receives weak ultrasound echoes from blood cells and body structure, amplifies these signals and converts them to an 12 bit digital signal.

The digital representation of this signal is presented to the mid processor section.

RXB (Receive Board): The Preamplifier amplifies echo signals. The reception signals are sent to DBF.

DBF (Digital Beam Former): Performs receive delay summing for channels

TXB (Transmit Board): This has channel bipolar drivers, delay calculators.

5-2-3 Mid Processors

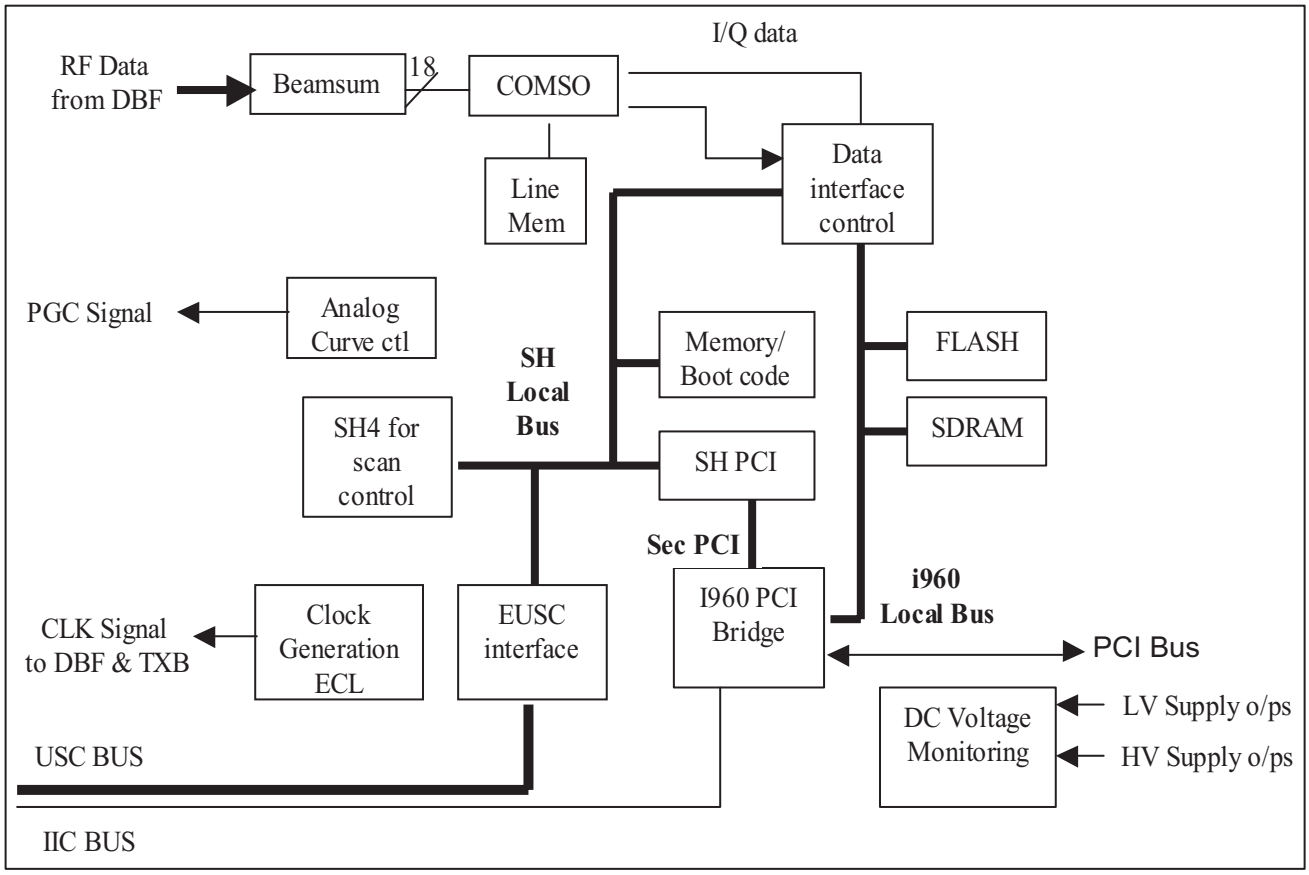


Figure 5-4 The Mid Processor

This block performs the adequate signal conditioning for Tissue and Doppler. This block is implemented in FEC only.

- BEAM SUMMING: adds the beam data from the two OQ Card banks (3 each) to make the one scan vector in FEC (Front End Control) ASSY.
- COMSO: makes the B / I / Q image data by filtering, enhancing, LOG compression, envelope detecting and so on.
- PCI-to-PCI Bridge: transfers the image data from COMSO through PCI DMA channel into PC main memory.
- SH-4: is in charge with real time control for scan operation and safety.

5-2-4 CPU/Backend Processor

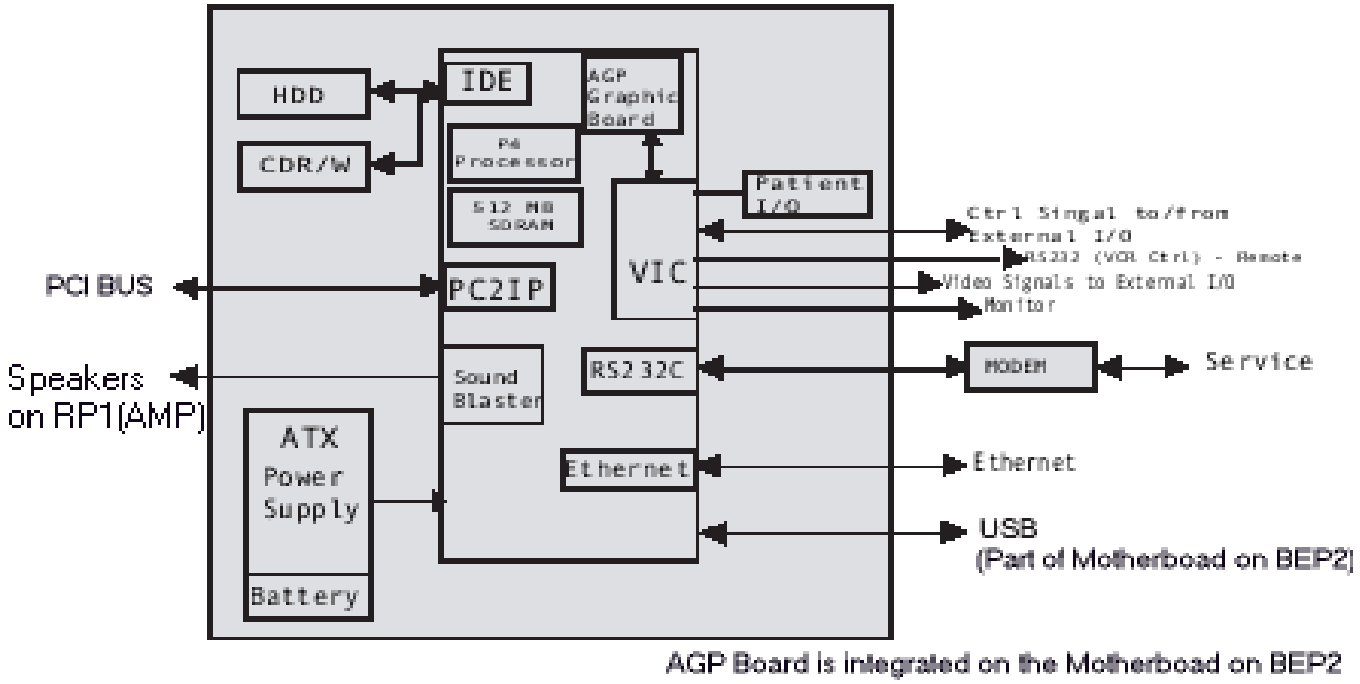


Figure 5-5 CPU/Backend Processor

The Back End Processor grabs the data from the FEC, stores it in a main memory, performs scan conversion to pixel domain and drives the system RGB monitor.

The Back End Processor grabs the data from the Front End, stores it in a main memory, performs scan conversion to pixel domain and drives the system RGB monitor. Back End Processor software is also providing B mode, M mode, CFM, Doppler processing

BEP Box include ATX smps and UPS battery, ATX type P4 motherboard and P4 CPU. Memory capacity is 512MB minimum. AGP and PCI slots on motherboard contains followings

- AGP video card displays image on monitor. Monitor display resolution is 800 x 600, 75Hz.

NOTE: There is no Separate AGP present on the BEP2. It is integrated on the motherboard of the BEP2

- PCI Slot #1 VIC Card: Video Converter Board for VCR playback and VCR recording and analog video image printing
- PCI Slot #2: Open slot
- PCI Slot #3 PC2IP card
- PCI Slot #4 Sound Card (integrated on the BEP Motherboard in BEP2)
- PCI Slot #5 Ethernet Card (integrated on the BEP Motherboard in BEP2)
- PCI Slot #6: Open slot for 3D sensor card option (to be introduced in the future)

Storing Devices:

- Hard Disk Drive (HD Drive) (Inside the PC box)
- CD R/W Drive (Available from the front of scanner).
- Optional Magneto Optical Drive (MO Drive) (Optional) (Available from the front of scanner).

5-2-5 VIC Card

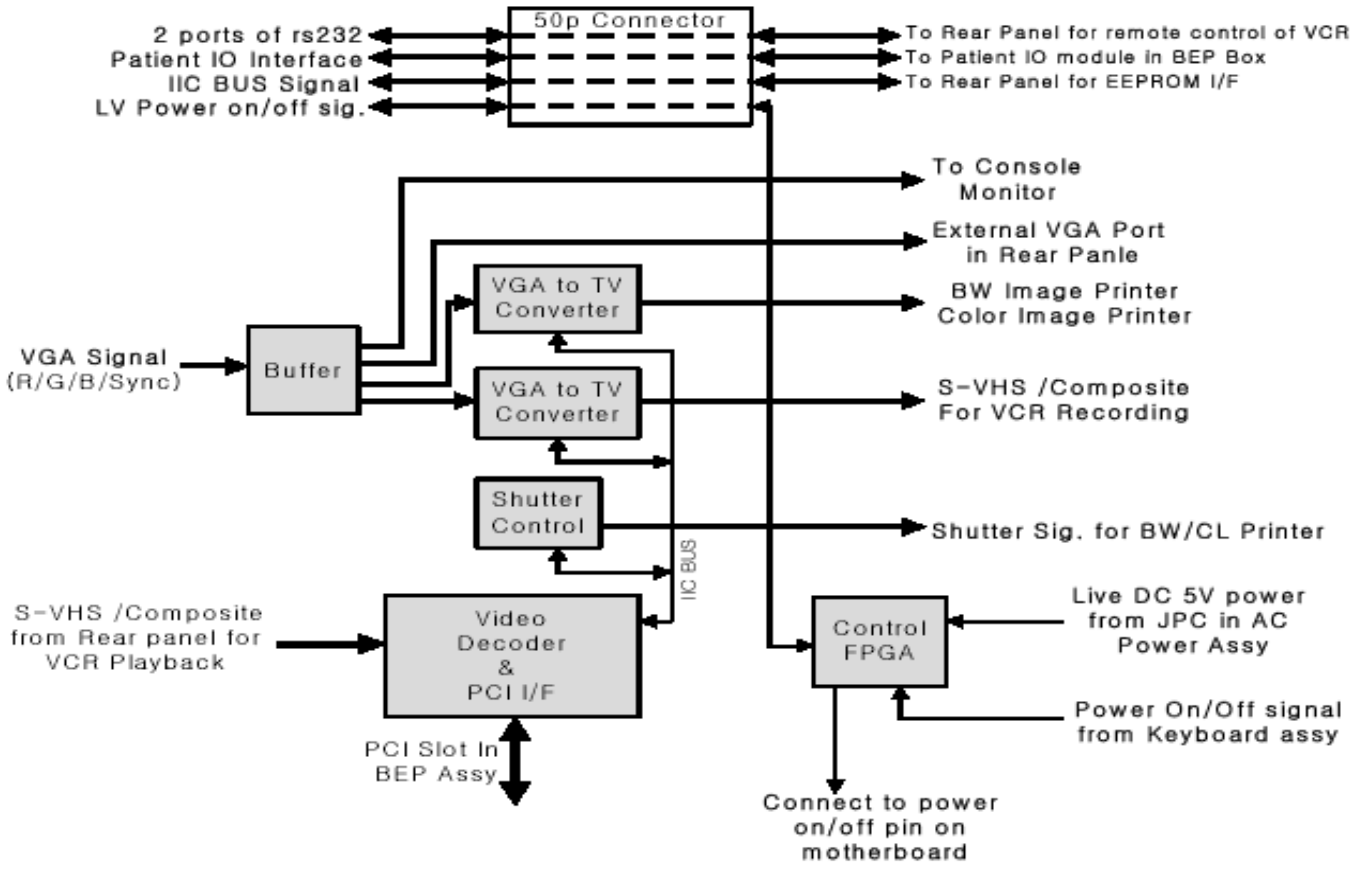

50p Connector
2 ports of rs232
Patient IO Interface
IIC BUS Signal
LV Power on/off sig.
To Rear Panel for remote control of VCR
To Patient IO module in BEP Box
To Rear Panel for EEPROM I/F
To Console Monitor
External VGA Port in Rear Panle
VGA to TV Converter
BW Image Printer
Color Image Printer
VGA Signal (R/G/B/Sync)
Buffer
VGA to TV Converter
S-VHS /Composite For VCR Recording
Shutter Control
Shutter Sig. for BW/CL Printer
IIC BUS
S-VHS /Composite from Rear panel for VCR Playback
Video Decoder & PCI I/F
Control FPGA
Live DC 5V power from JPC in AC Power Assy
Power On/Off signal from Keyboard assy
PCI Slot In BEP Assy
Connect to power on/off pin on motherboard

Figure 5-6 VIC Board

VIC Card perform video conversion operations and Power on/off control.

- Video Decoder: Video decoder convert S-VHS or composite video analog signal to digital RGB data and send the RGB digital data into BEP main memory on motherboard through PCI bus. And then this video digital data is displayed on console monitor. Video analog signal comes from rear panel. This video decoder also have IIC bus interface logic.
- VGA to TV Convertor: This device convert the VGA display signal to TV display signal for B/W printer and color printer and VCR recording.
- Shutter Control CPLD: Shutter signals for analog B/W printer and color printer are generated by this CPLD. And this CPLD is controlled by video decoder via IIC bus.
- Power Control FPGA: This FPGA generates power on/off signal. This device is alive always by live DC power which comes from ACI assy in AC Power Assy. So this device monitor the status of power on/off switch on the keyboard. If power switch will be pushed once, this device turn on the LV power supply in AC power assy and after few seconds, turn on the BEP assy.

5-2-6 Patient I/O (Option)

The optional Patient I/O is mounted at the front of the scanner with its connector panel.

Available inputs:

- PCG
- ECG
- AUX1
- AUX2
- Top Console

The Top Console includes a Stand By/On switch, a keyboard, different controls for manipulating the picture quality, controls for use in Measure & Analyze (M&A), and loudspeakers for stereo sound output (used during Doppler scanning, inside the Keyboard assy).

5-2-7 Keyboard

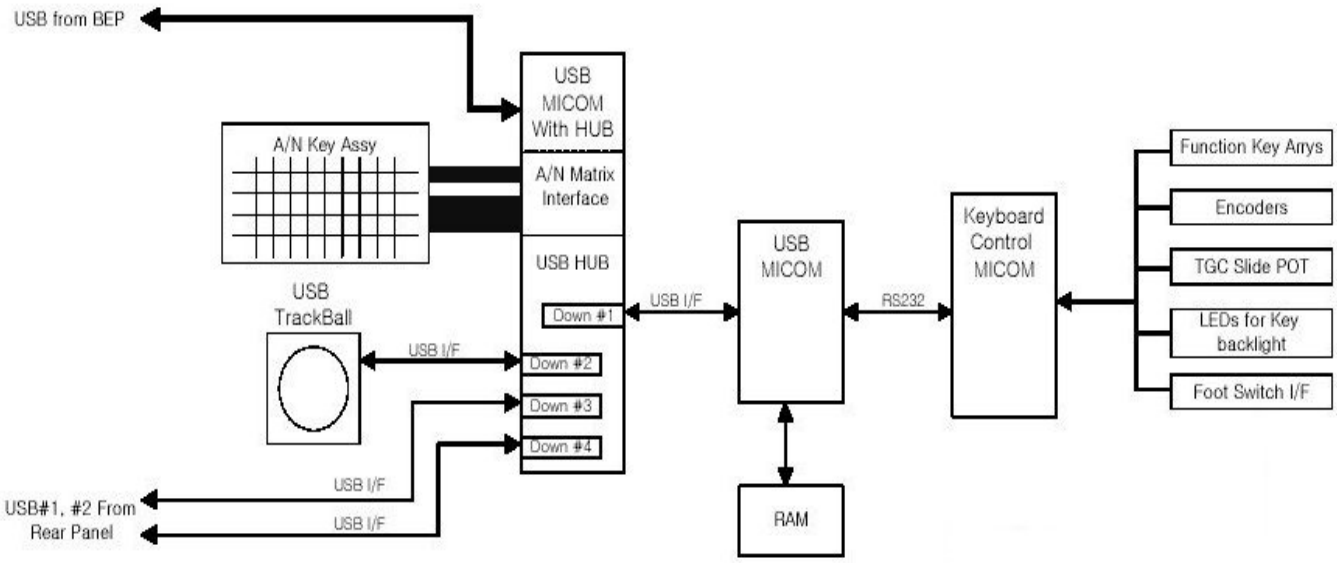


Figure 5-7 Keyboard Block Diagram

Keyboard assy provide all of operator interface for scan.Keyboard assy consist of several pieces of main function assembly.

- USB HUB Assy: The USB HUB assy has USB interface for upstream USB port which comes from BEP. USB HUB assy also has alpha numeric key interface, control functions and USB hub. So the USB trackball, the USB of main assy and additional 2 USB ports of the rear panel are connected to the USB HUB.
- MAIN Assy: The Main assy has a USB micom to interface between the main assy and USB hub assy. All function keys' and encoders' interface and controls are done by an additional control on the micom chip.

5-2-8 Monitor

15 inch high resolution RGB monitor with non interlace scan includes a task lamp to light up the A/N key on keyboard assy

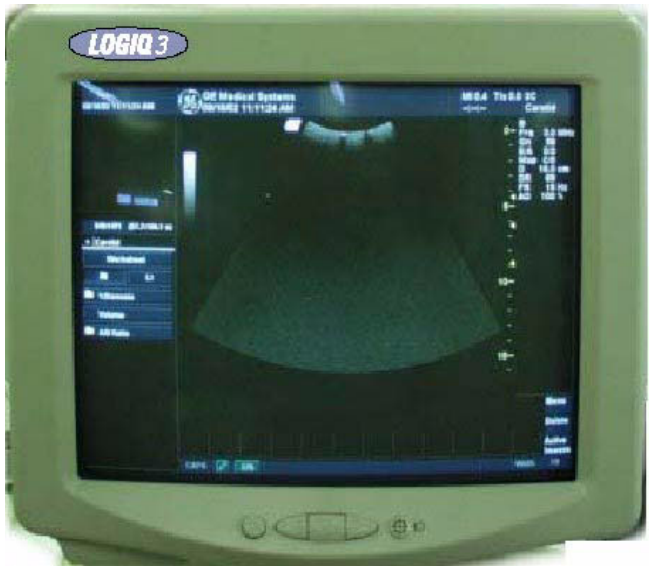


Figure 5-8 Monitor

Section 5-3
External I/O on the Rear Panel

The External I/O is the interface between the scanner and all external items, located at the rear side of the scanner.

Examples: InSite, TCP/IP network, Printer, etc.

Section 5-4
Peripherals

Black & White Video Printer (Optional) is installed onboard the scanner. VCR, Color Printer are connected off board through the External I/O (Rear Panel). For Connecting the Peripherals refer to Peripheral Option Manuals.

Section 5-5
Power Diagrams

5-5-1 Overview

The AC Power's main tasks are to supply the various internal subsystems and to galvanically isolate the scanner from the on site Mains Power System. To reduce inrush current, an inrush current limiter board has been included in the AC box.

5-5-2 AC Power

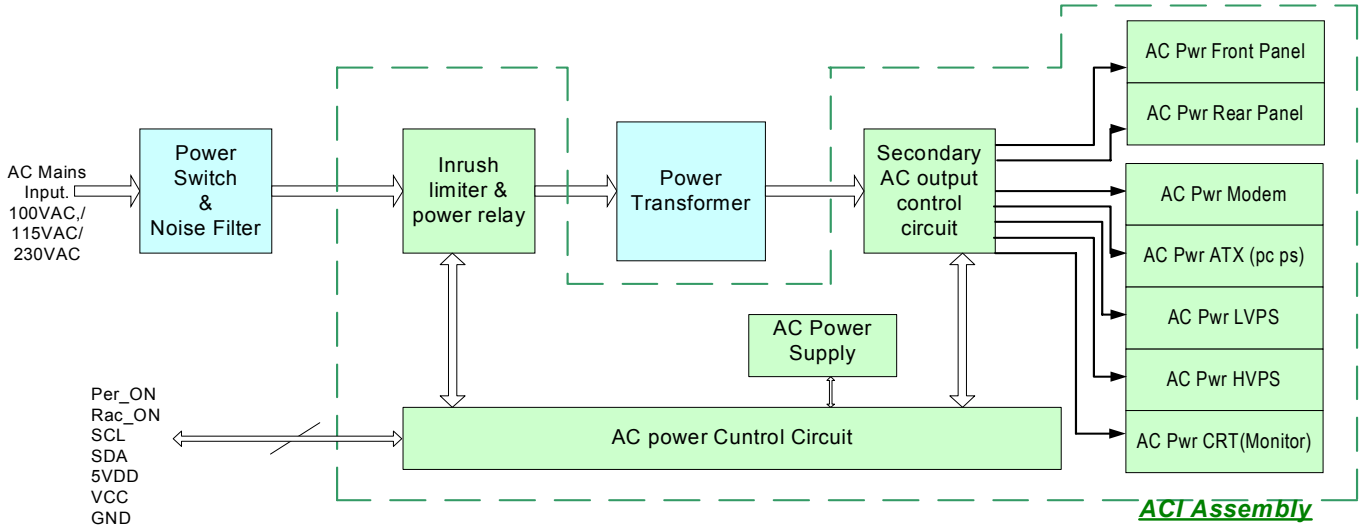


Figure 5-9 AC Power Distribution Block Diagram

The mains cord has plugs in one side end. A male plug connects to the mains outlet on site.

The mains voltage is routed to the Main Circuit Breaker, located on the rear of the system.

The Main Circuit Breaker is of the auto fuse type, if for some reason the current grows to high, the switch will automatically break the power.

From the Main Circuit Breaker, the AC power is routed via an Inrush Current Limiter to a internal outlet connector for the Mains Transformer.

5-5-2 AC Power (cont'd)

The Transformer is the galvanic barrier between the rest of the scanner and the on site AC Mains. Input voltage to the transformer can be either 230 VAC or 115 VAC or 100 VAC.

AC Power is supplied directly to the ATX PS (PC Power supply, located on the PC box) and to the HV unit CRT Monitor and LV unit via ACI PCB.

When the Power switch is ON, this signal is outputted from VIC board to the following devices via KBD>RPI>VIC> Mother board.

- The signal is sent to PC Box, then sent to ATX PS, so that the ATX PS is switched ON to apply DC power to the PC.
- The signal is sent to ACI PCB so that the SSR is switched ON to apply AC power to the LV unit, HV unit, and CRT monitor.
- The signal is sent to ACI PCB so that the SSR is switched ON to apply AC power to AC outlets of the Rear panel/Front Panel

5-5-3 DC Power (Low Voltage)

AC110V is supplied to the LV unit via AC Box > Transformer > ACI PCB. This is multiplied and rectified then step-downed to Low DC voltage to supply the devices/boards in the scanner.

The LV also support 12VDC for the system cooling fan.

DC Output Capacity:

- +3.3V, 20A
- +5VD, 14A
- +5V, 10A
- -5V, 3A
- +12V, 4A

5-5-4 TX Power/HV Power Supply

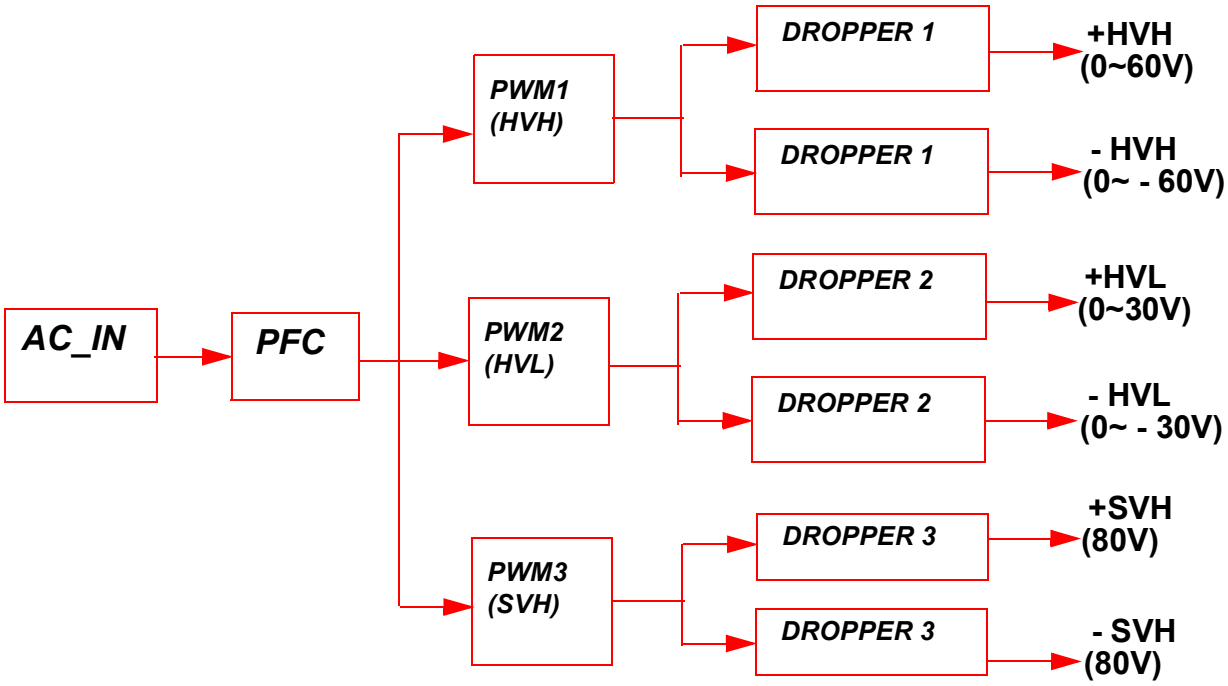


Figure 5-10 HV Unit Block Diagram

5-5-4-1 Overview

AC110V is supplied to the HV unit via AC Box > Transformer > ACI PCB. This is applied to the PFC, inside the HV unit. The PFC convert AC100V to DC400V, and DC voltage is applied to DC/DC, then to HVH, HVL, and SHV using dropper. They convert DC voltage to proper voltage to be outputted.

5-5-4-2 Specifications

DC Output Capacity:

- HVH: +/- 0V to +/- 60V variable, Max. 110W, Max. 2A
- HVL: +/-0V to +/- 30V variable, Max, 70W, 1A
- +SHV: +80V +/- 5%, 80mA
- -SHV: -80V +/- 5%, 80mA

5-5-4-3 Output Signal to FEC

The following signals are sent to FEC via BACKPLANE board.

- OV (Over Voltage), OC (Over Current) of each power source: HV tests in itself. The result transmits the FEC via BACKPLANE ASSY.

5-5-4-4 Input Signal from FEC

The following signals are sent to HV unit via FEC > BACKPLANE board.

- +5V, +/- 12V, HV STOP: These signals are sent to PFC to control DC voltage output of HVH, HVL, and -SHV. Normally HVSTOP is ON
- HVH Ref, HVL Ref: These are the digital signals (8 bits) sent to the DAC of HVH or HVL from FEC. Consequently, The DC Voltage (0 - 60V) is outputted from HV unit.

Section 5-6
Circuit Boards Descriptions

The following table lists circuit boards and their respective card cage slot assignments on the mother board of the LOGIQ™ 3 system.

Table 5-2 CIRCUIT BOARD DESCRIPTION

Card Cage Slot	Board Name	Description	Note
1	TXB	Transmit Board	
2	RXB	Receive Board	
	CWD	Continuous Wave Doppler Board	
3	DBF	Digital Beam Former	
4	FEC	Front End Controller	
5	HVPS	High Voltage Power Supply	
	ACI	AC Control Interface	
	Conn.	Connector Board	
	RPL	Rear Panel Assy	RPI + RP1 + RP2
	LVPS	Low Voltage Power Supply	
	RPI	Rear Panel Interface	
	BPB	Back Plane Board	

5-6-1 Front End

5-6-1-1 Connector Board

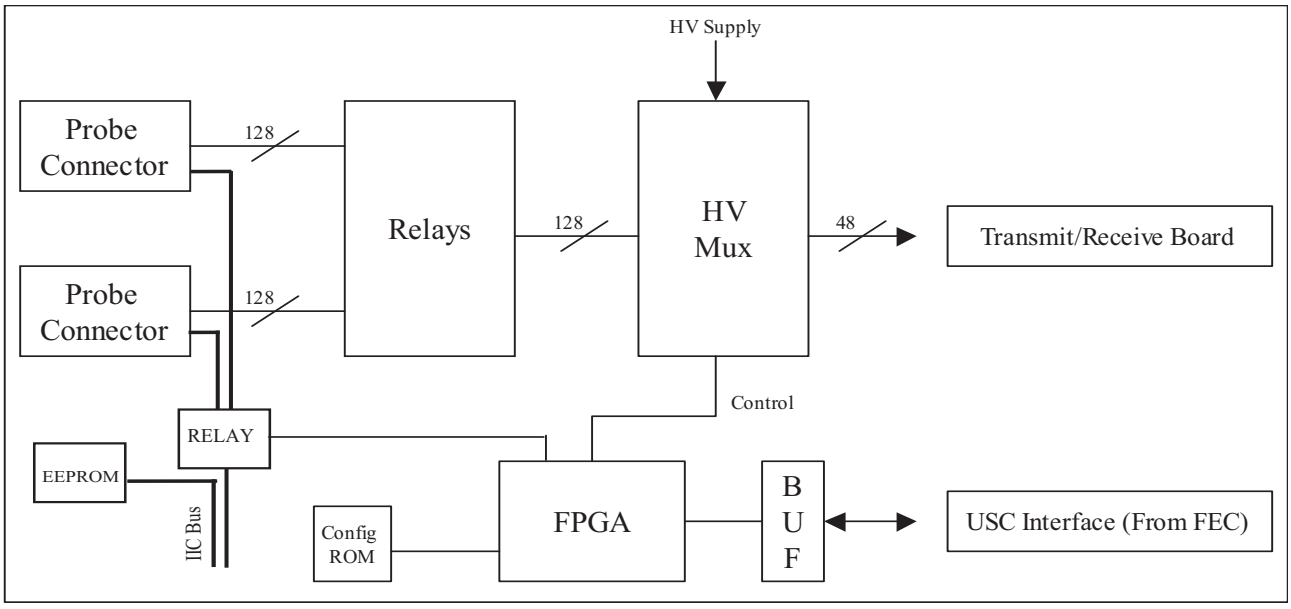


Figure 5-11 Connector Board

Overview

Conn. Board contains of 2 phased array probe connectors and provides switchable connection between probes and transmitters/receivers.

The main function of Connector Board is as follows.

- 2-to-1 selectors for two probes.
- Interface with USC bus (control bus)
- Interface with FEC ASSY for IIC bus.
- Supply/Cut control and failure detection of supply voltage for Mux circuit in a Probe.
- Device: Mechanical Relay
- Switch: 128Ch 2:1 selector
- Max. Voltage: 140Vp-p
- Max. current: 0.5A

Interface to Probe

- Probe Status detection
  - Detects whether or not a probe is connected.(POPEN)
  - Detects ID code of a connected probe.(PCODE)
- Mux Interface
  - Transfers control data of Mux to a probe.(CONSYS,CONSTA)
  - Enables/Disables control of data.
  - Detects whether Mux data setting is finished or not.

- Power Supply for Mux
  - Supply/Cut control:
    +5V and +12V on a connector are supplied while a probe is connected to the connector.
    +/-SHV are supplied only while a probe is selected.
- Surface temperature
  - Detects resistance of a thermistor in a probe head as voltage when the probe is selected.(PTEMP) This signal is connected to FEC.
- LED Blinking
  - The LED in a probe glows when the probe is selected. (Only on Selected probe which have LED's)

IIC bus

- Connects signals of IIC bus with a relay when IIC bus access is required.
- Selects one of two probes that IIC access with 2-to-1 switch.
- Board Rev, Board No., Part No., are stored in EEPROM and sent to FEC through IIC Bus.

5-6-1-2 Transmit Board

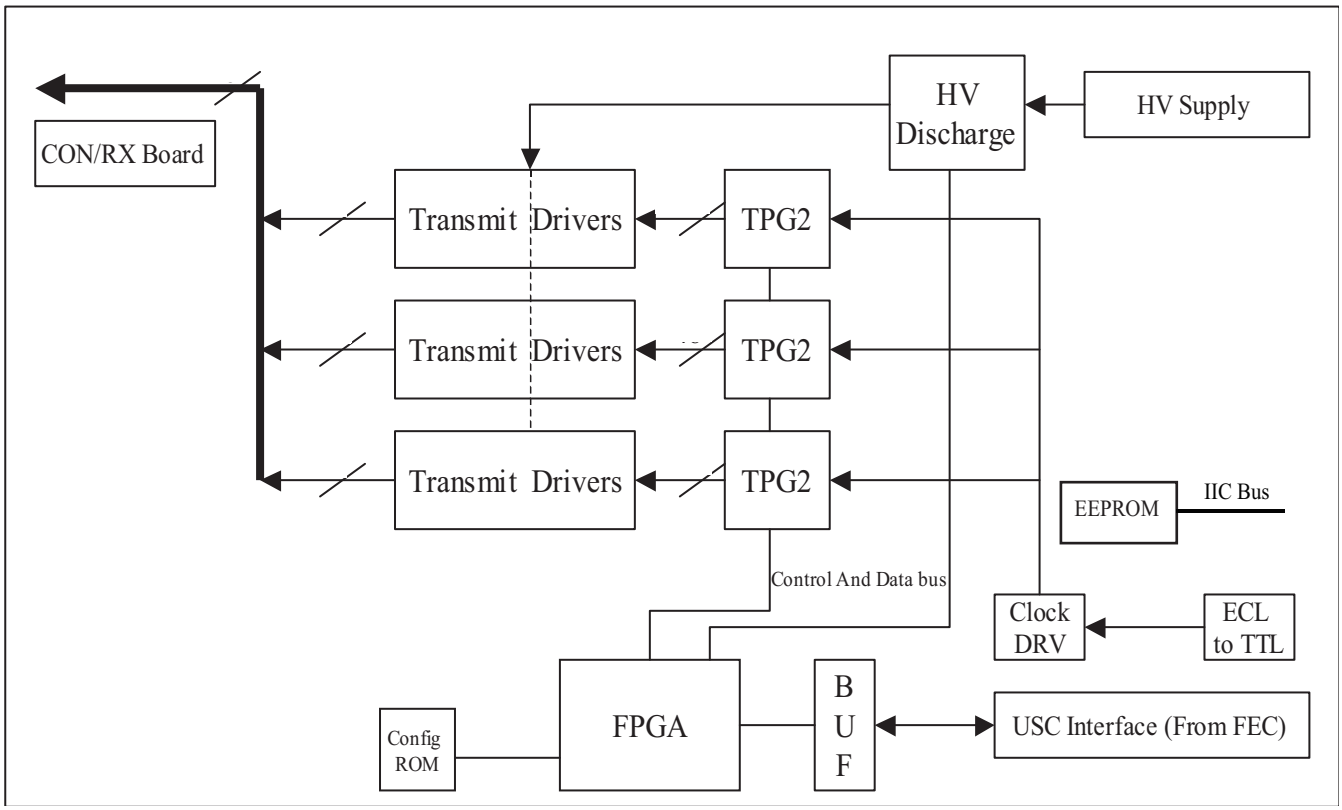


Figure 5-12 Transmit Board Block Diagram

Overview

The TXB Assy (Transmit Board) is designed for LOGIQ™ 3 system transmitter. This Assy has bipolar drivers, transmit pulse generator ASIC and so on.

Key Features

- Main Items are
  * TXIC: FPGA Interface and controller FPGA.
  * TPG 2 ASIC: Controller of pulse driver, Mixed signal ASIC.
- Bipolar drivers.

5-6-1-3 CWD Board

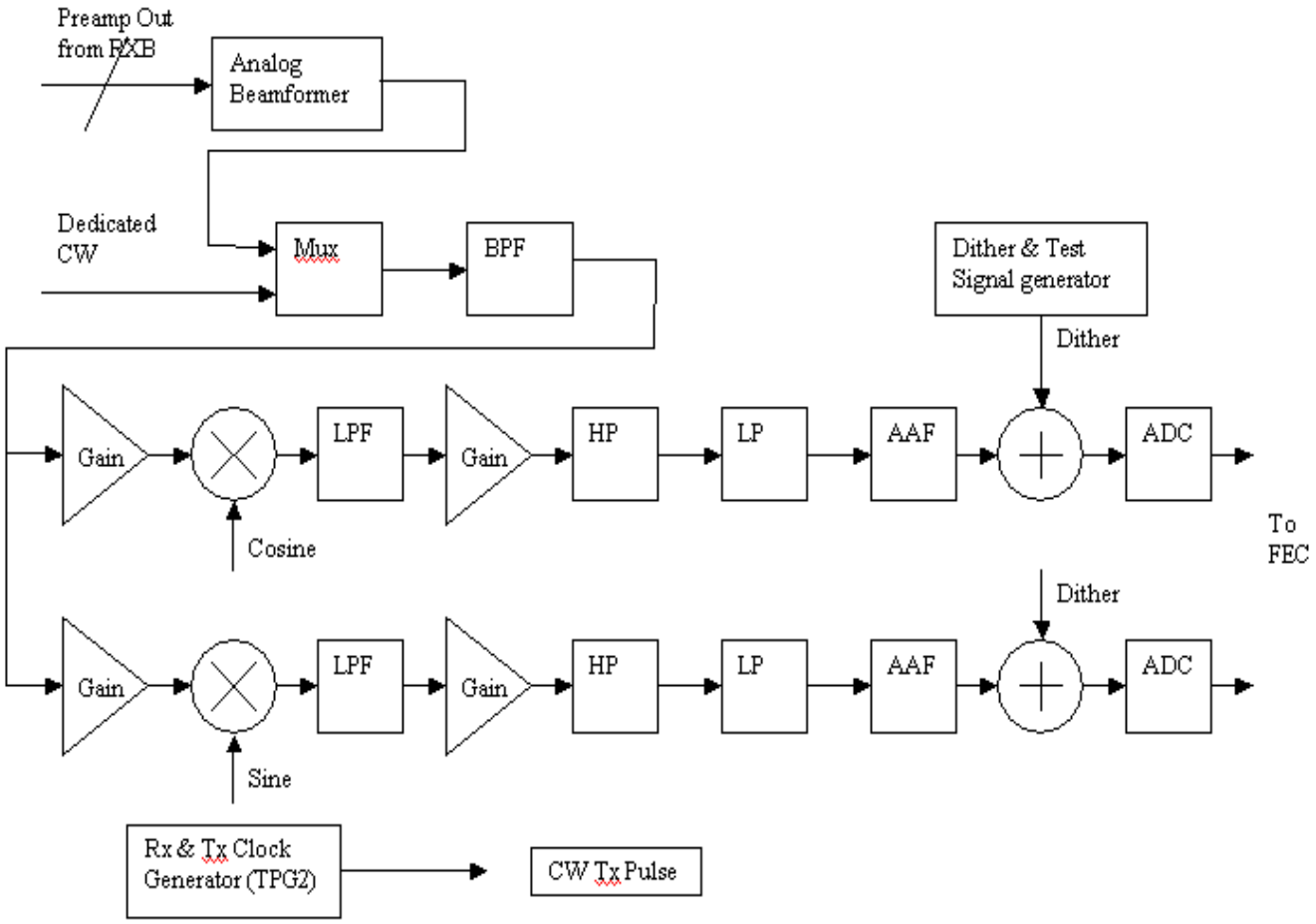


Figure 5-13

The major function of this board is analog beam forming by acting as a steering beam former and de-modulator. It receives analog input from the RXB via the RFC2 board and digital control input from FEC via the BPB.

It gives its digital output to FEC.

5-6-1-4 Receive Board

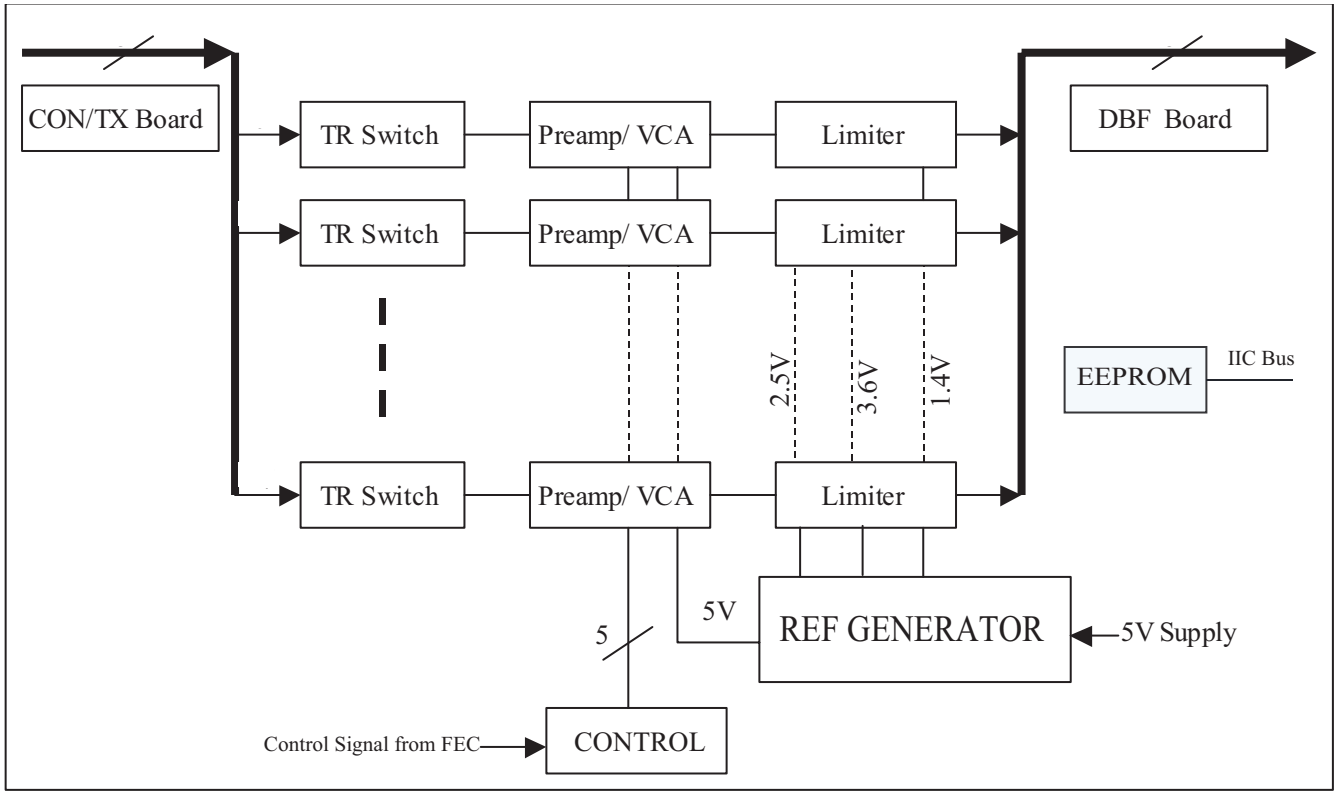


Figure 5-14 Receive Board

Sub-system receives and amplifies each echo signal. Then, all echo signals are outputted to the DBF Assy.

The RXB ASSY can amplify the echo signals. So, the echo signals are received by a RXB ASSY under appropriate control. The RXB ASSY are inserted into Nest box, which is composed of BACKPLANE and other boards.

The RXB ASSY have main three blocks: TR Switch, Pre-amp and Gain Control and Mode control block.

The Transmit/Receive Switch protects the receive amplifier from high voltage transmit pulse the RXB ASSY amplifies the echo signals. The mode control block selects a maximum gain code via dedicated control signals from FEC.

The analog voltage signal provided by Gain Control block gives total amplified gain.

The block diagram above of the RXB ASSY for a received signal is given. Actually, there are 48 echo adaptive channels in the assy.

The Pre-amp block consists of Low Noise Amplifier (LNA) which amplifies the RX Signal by fixed Gain and Time Gain Control Amplifier (TGC).

The Pre-amp block is controlled by totally 4digital signals and an analog signal. In digital, One for input impedance alternative low or high mode, another (3 bits) for choice of maximum gain code.

5-6-1-5 Digital Beam Former

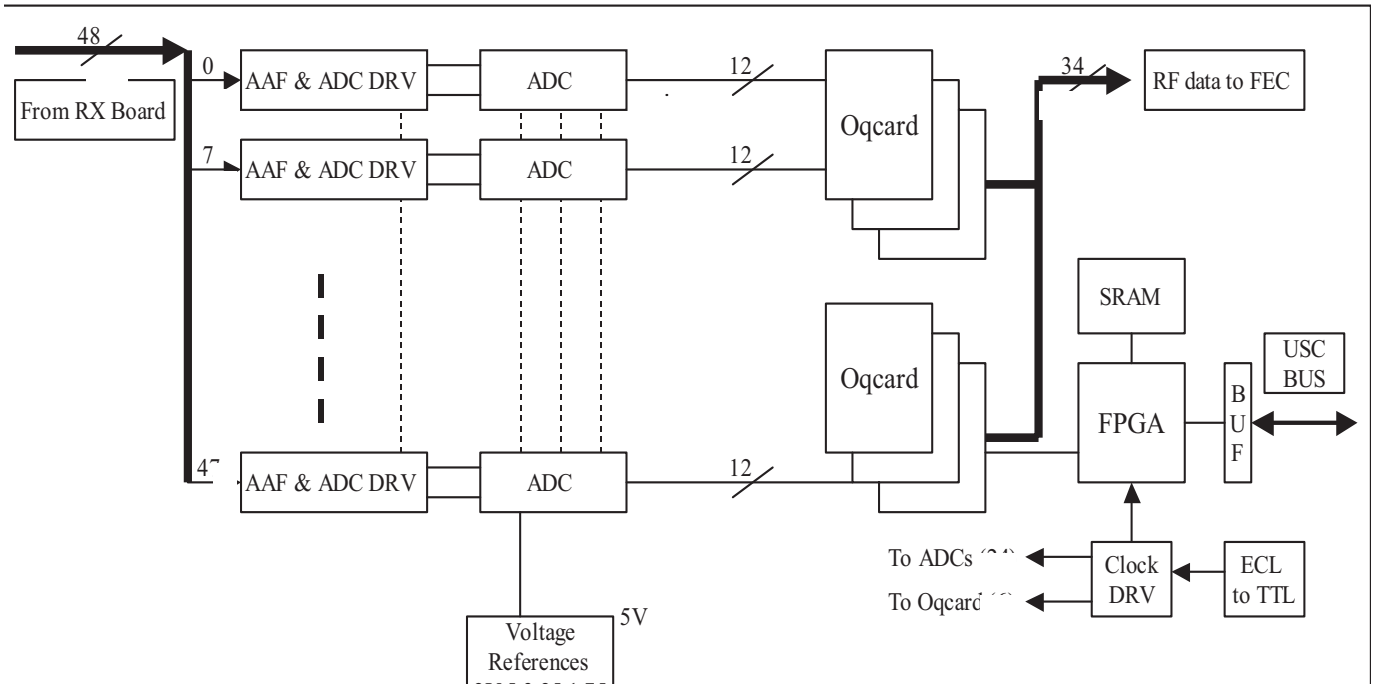


Figure 5-15 DBF Block Diagram

Overview

The DBF sub-system is the receiving Digital beam former.

The DBF sub-system is delay summing echo signals after pre-amplification and time controlled gain at the RXB ASSY. Then, the DBF sub-system adds the delay sum data and transfers the results to the FEC sub-system.

The block diagram is shown in the Figure above.

The DBF sub-system consists of delay summing part and its controller part.

Control Part

- Function Outline
  - Interfaces with CPU through USC Bus.
  - Generates receive timing.
  - Controls OQCARD's operation.
  - Controls delay data transfer from SRAM memories to OQCARD’s.

- Operation Description
  - Scan Mode:
    This mode is for imaging. The parameters specific to scan line number are sent to OQCARD's and the start trigger for receiving signals is generated.
  - Access Mode:
    This mode is for accessing SRAM memories and OQCARD's.

5-6-2 Mid Processors

5-6-2-1 FEC

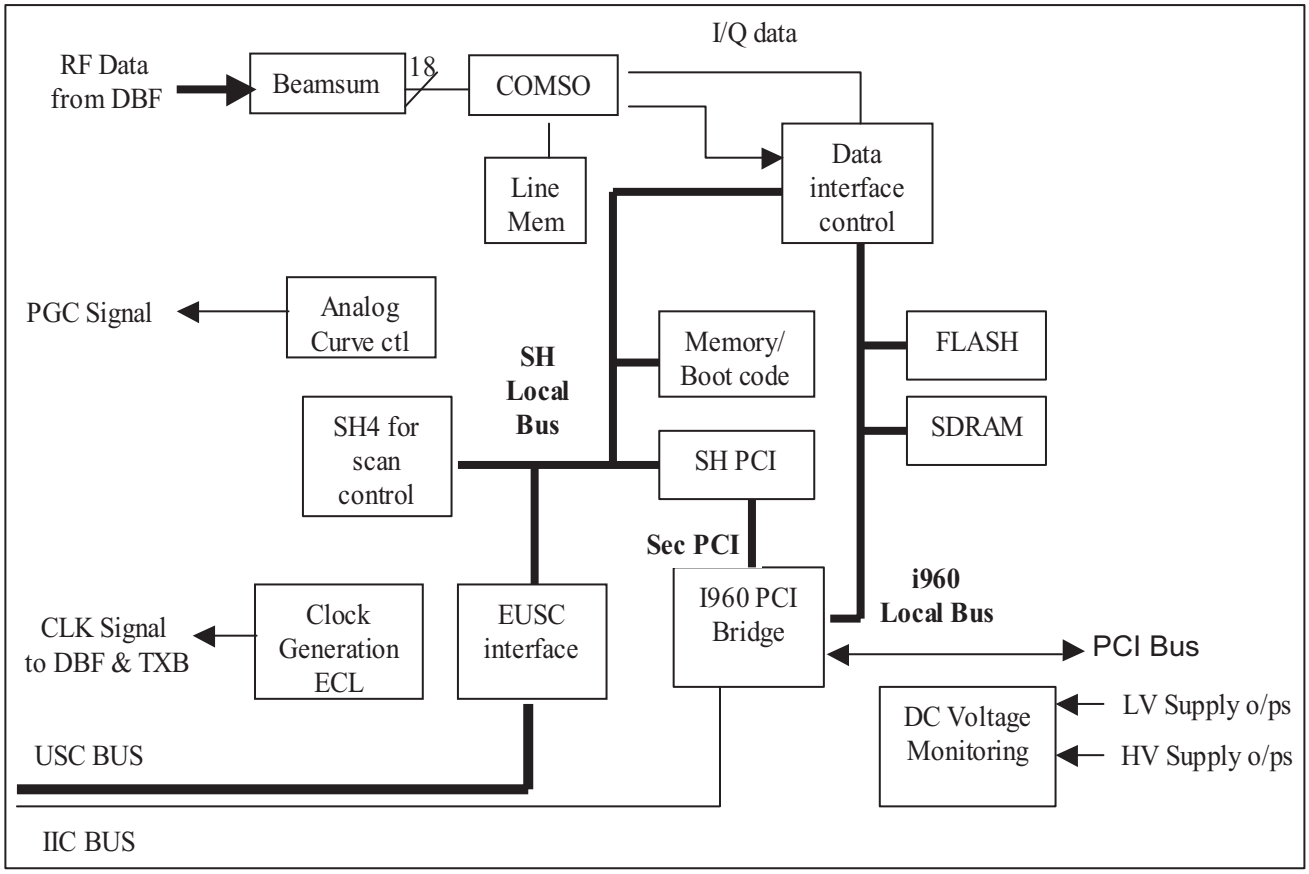


Figure 5-16 FEC Board

Overview

Key Features

- CHAF:(SPARE)
  Three CHAFs have functions of coded excitation decorder and 2nd harmonic filter.
- COMSO:
  Has functions of detector, B/M mode edge enhance, Log compression, and dynamic range control.

- PCI IF:
  Converts USC bus in FEC board. The local bus is connected to each block. It transfers B/M mode data to PACO FPGA via the COMSO data bus.
- USC IF:
  Has functions of generation to USC bus, generation of TGC signal and test signal for self-diagnostics, COMSO control, IIC Bus.
- CLK Generator Block:
  Generates 40MHz (two phases), and 26.6MHz clock using 160MHz master clock.
- Real Time Controller (RTCL):
  The TRIG cyclical Real Time Control is done by SH4 RISC processor. SH4 is a one of MID BUS agent through SH-PCI bridge.
- PCI - PCI Bridge:
  It Bridges between Mid bus and host side PCI bus by using i960RP. Mid bus is basically compliant to Compact PCI. Primary side PCI is connected to Host PC through PCI cable and PC2IP which is mounted on PCI slot of PC-motherboard.
- Image Data Transferring:
  It receives image data from COMSO, and send them to Host side. Data is buffered when receiving on COMSO data bus. After buffered, data is stored and handled on Local side of i960. And DMA function of i960RP perform data transferring to host PC memory.
- Peripheral Control:
  The SH4 or i960RP also performs other functions like safety observation, HV Control and so on

5-6-2-2 THI Board

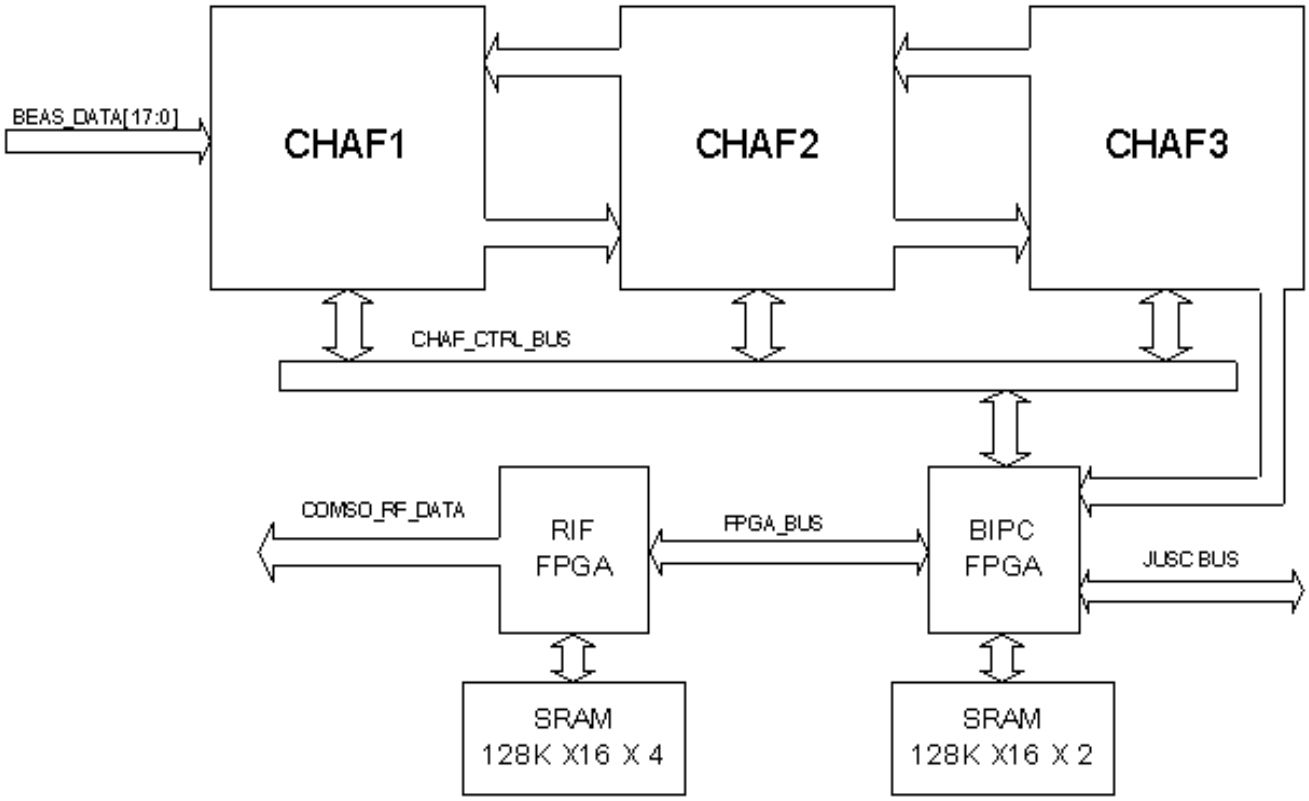


Figure 5-17

THI board gives an improved axial resolution and contrast feature.

THI is implemented using CHAF ASIC.

5-6-2-3 PC2IP Board

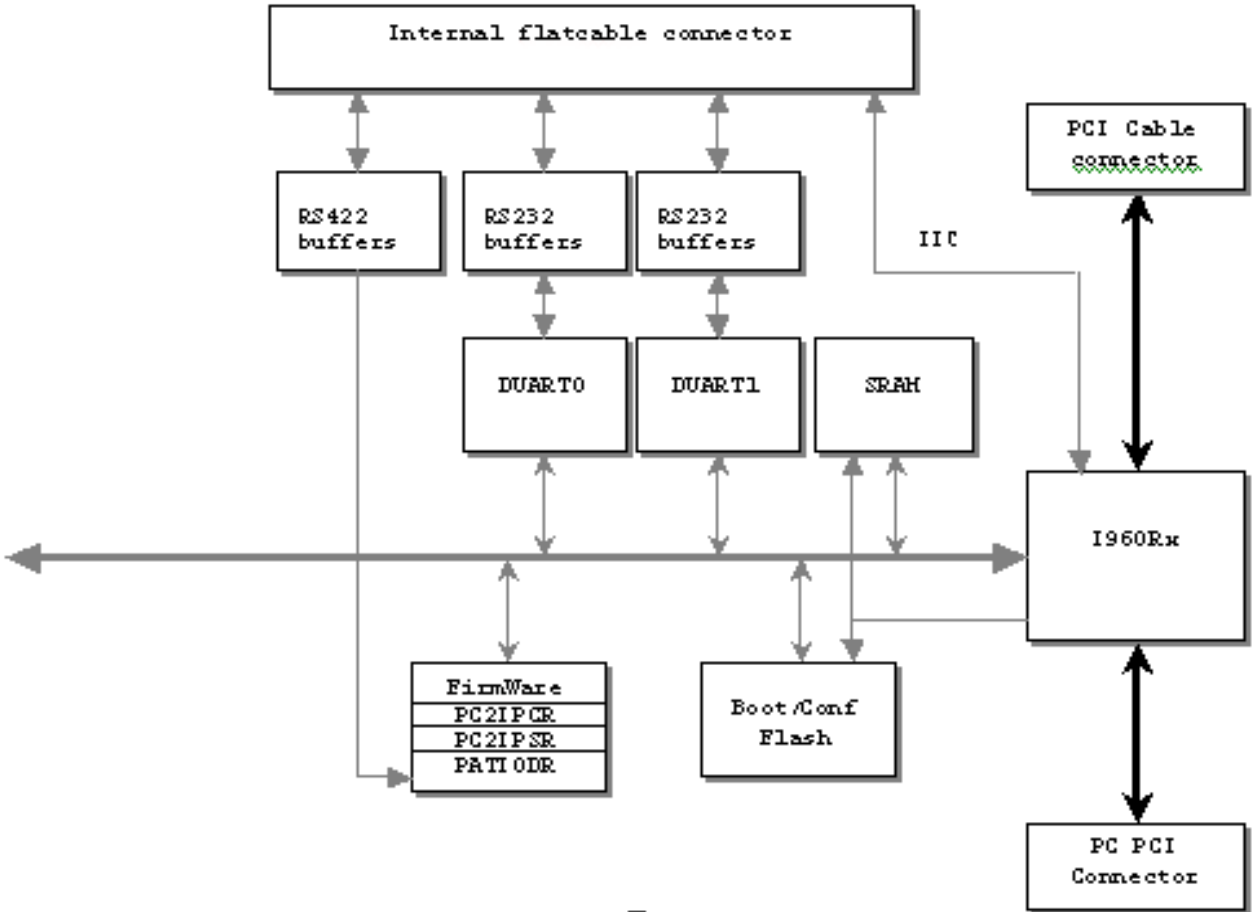


Figure 5-18

The PC2IP acts a means for communication between FEC and the BEP.

It is implemented using an Intel I960 IC.

5-6-3 CPU/Back End Processor

5-6-3-1 PC BOX

The PC Box contains:

- CPU, Mother Board, AGP Video Card and LAN Board
- ATX Power Supply
- HDD
- CD R/W
- ECG (Option)
- PCG (Option)

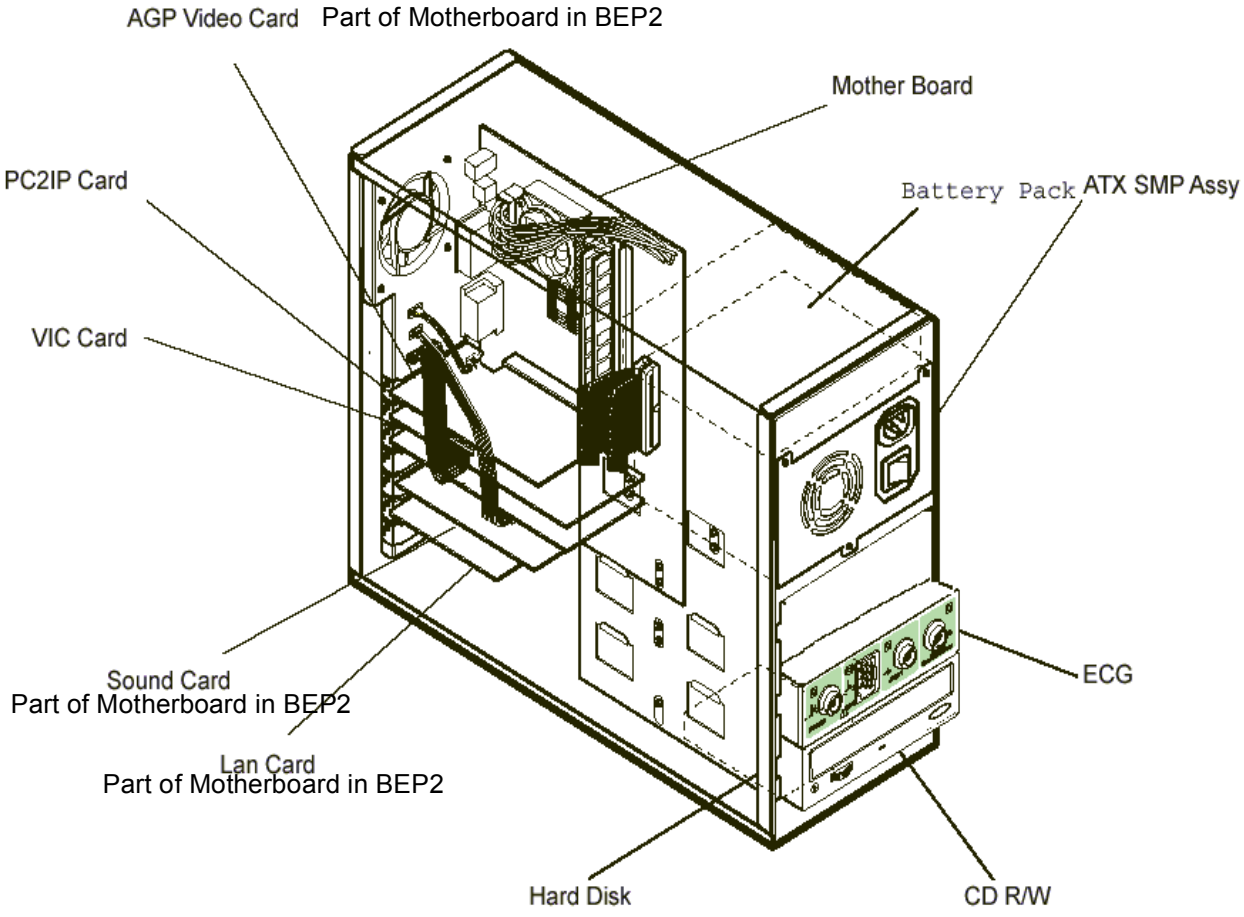


Figure 5-19 PC Box

5-6-3-2 Rear Panel

The Rear Panel Assy interconnects external signals and power with the LOGIQ™ 3 system.

Safety

- Rear Panel Fuses

Table 5-3 Rear Panel Fuse Specification

Assembly	Power Voltage Rating (V)	Peripheral Current Rating (A)	Trip Time	Reset Time
Rear Panel	100	5.0	1 hour max. @ 5.4A, 25 degree C	60 seconds
Rear Panel	115	5.0	1 hour max. @ 5.4A, 25 degree C	60 seconds
Rear panel	230	3.0	1 hour max. @ 3.5A, 25 degree C	60 seconds

- Electrical Isolation
  The rear-panel's Insite (modem) interface is electrically isolated from the system's internal circuit. The isolator's dielectric strength should be 500VAC RMS or higher within 1 minute (in compliance with IEC60601-1-1).

Printer (Camera) Remote Control Interface

The Rear-panel has two remote control interface terminals for B/W and color printers.

Table 5-4 Camera (Printer) Remote Control Interface Specifications

	Level (V)	Active Polarity	Retention Time
Color camera (shutter) control	H:2.0/L:0.8	L	60 msec
B/W camera (printer) control	H:2.0/L:1.0	L	800 msec

Section 5-7
Mechanical Descriptions

5-7-1 Monitor

- Tilt: 10° forwards and backwards
- Swivel: 90° From mean position

Section 5-8
Air Flow Control

5-8-1 Air Flow Distribution

The four air flow passes allow the scanner to be cooled down as below.

- Pass A (Bottom right> PC Box > Rear upper left) for PC Box cooling.
- Pass B (Front lower left > Filter > LV unit > Rear lower left) for HV unit cooling.
- Pass C (Bottom left> Scan Box Assy > Rear upper right) for Scan Box Assy cooling.
- Pass D (Bottom left> Filter >Nest Assy> Rear upper right) for Nest Assy cooling.

5-8-2 Filters

The scanner contains one filter located below the Front Bumper Between Two Wheels.

5-8-3 Fans

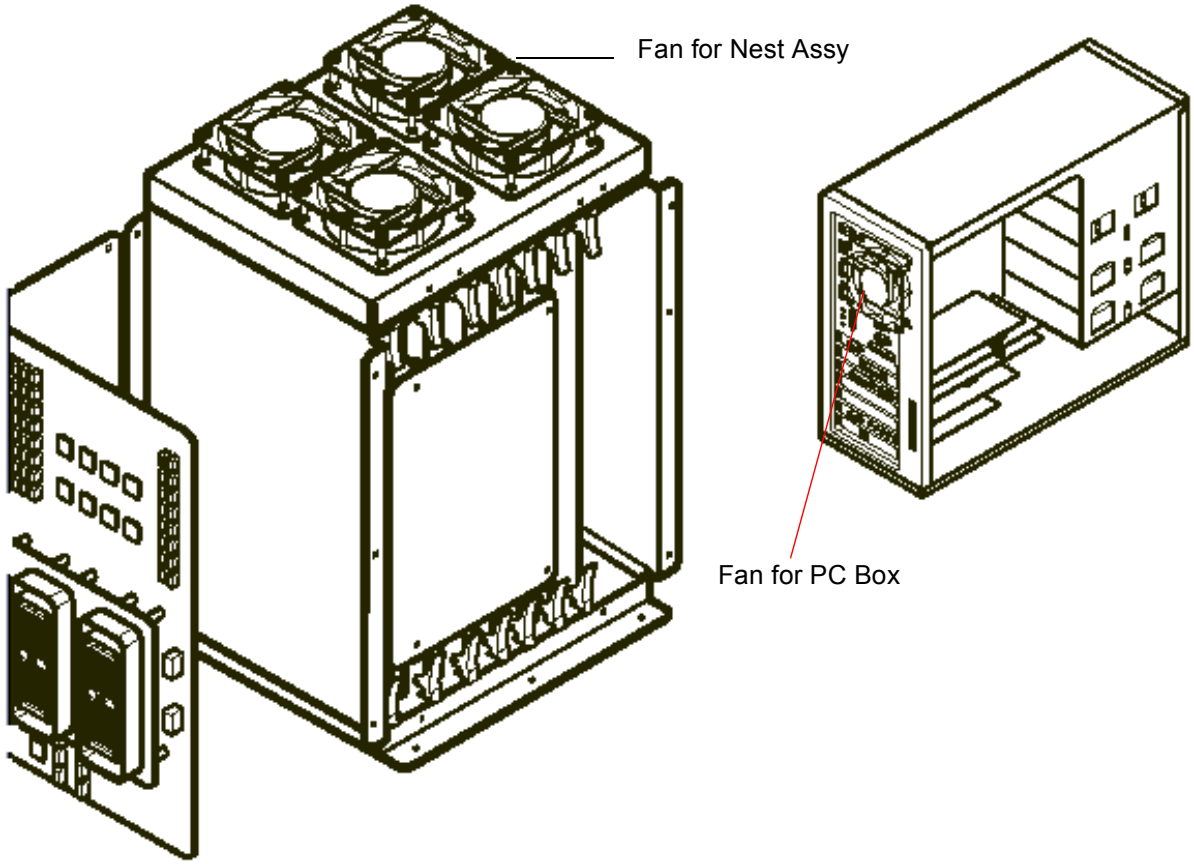


Figure 5-20 Fans

The scanner contains the five fans at the following positions for producing an air flow.

- One fan: On the PC Box for air flow pass A
- Four fans: At the top of the NEST Assy for air flow pass D

Section 5-9
Common Service Platform

5-9-1 Introduction

The Service Platform contains a set of software modules that are common to all PC backend ultrasound and cardiology systems. This web-enabled technology provides linkage to e-Services, e-Commerce, and the iCenter, making GE's scanners more e-enabled than ever. The Common Service Platform will increase service productivity and reduce training and service costs.

5-9-2 Global Service User Interface (GSUI)

5-9-2-1 Internationalization

The user interfaces provided by the service platform are designed for GE personnel and as such are in English only. There is no multi-lingual capability built into the Service Interface.

5-9-2-2 Service Login

Select the wrench icon in the status bar at the bottom of the scan display screen. This icon links the user to the service login screen.

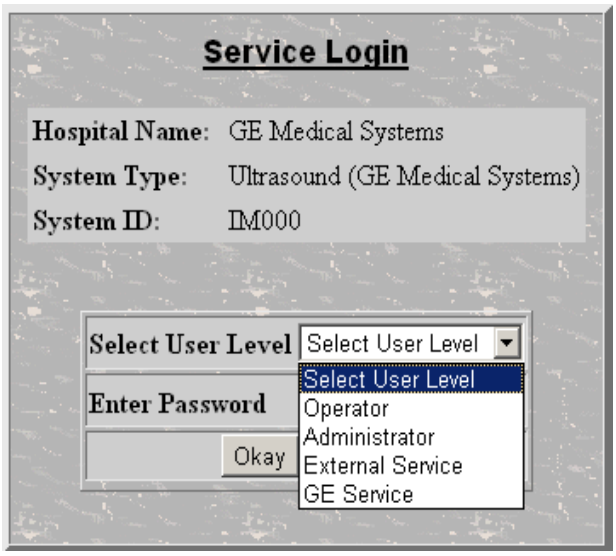


Figure 5-21 Login Screen for Global Service Interface

5-9-2-3 Access / Security

The service interface has different access and security user levels. Each user is only granted access to the tools they are authorized for their use.

NOTE:

Table 5-5 User Level Access

User Level	Access Authorization	
Operator	Authorized access to specified diagnostics, error logs and utilities. Same acquisition diagnostic tests as GE Service.	uls
Administrator		uls
External Service		gogems

NOTE: For a GE Field Engineer, the password changes at specific intervals. Access with the password listed to the service key.

Every access request, whether successful or not, will be logged into a service access log that is viewable to authorized users.

5-9-3 Service Home Page

The navigation bar at the top of the screen allows the user to select from several tools and utilities.

5-9-4 Error Logs Page

From the Error Logs page the Log Viewer displays four categories with pull-down sub-menus and an Exit selection. The Service Interface allows scanner logs to be viewed by all service users.

The Filter Error log is not available to customer level analysis.

The log entries are color-coded to identify the error level severity at a glance

Table 5-6 Log Entry Key

Severity	Error Level	Color Code
1	Information	Green
2	Warning	Blue
3	Error	Red

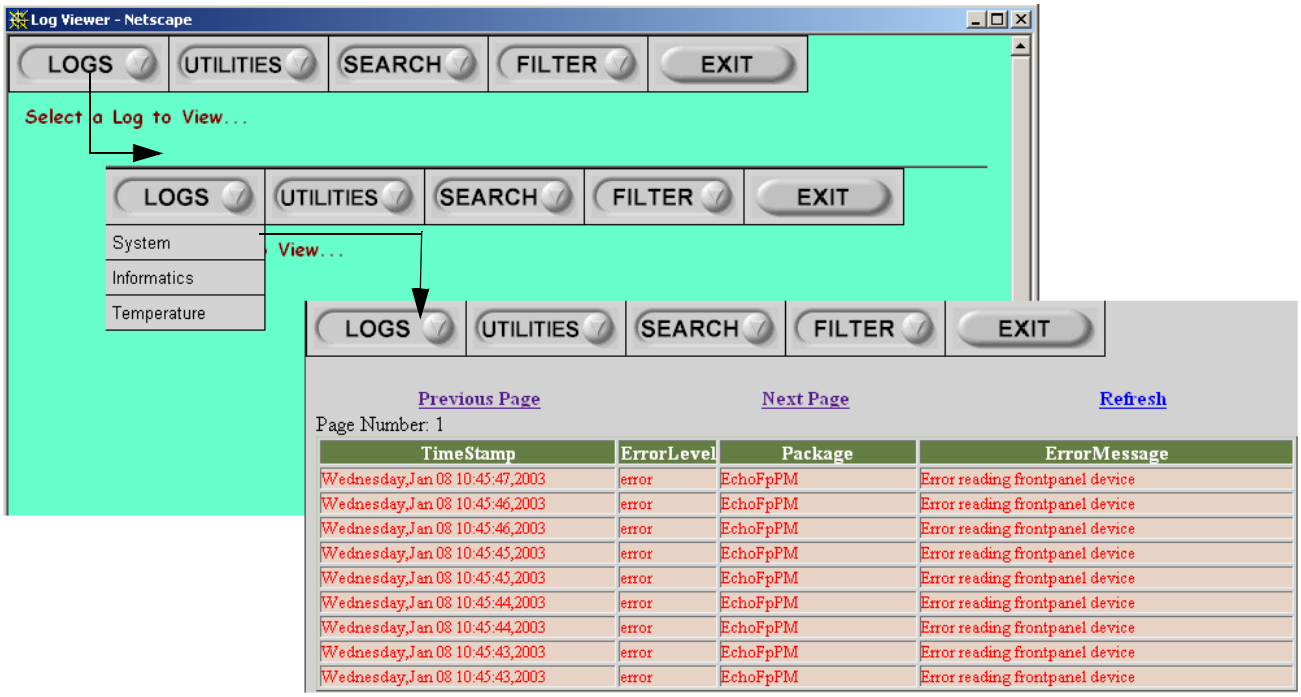

Log Viewer - Netscape
LOGS
UTILITIES
SEARCH
FILTER
EXIT
Select a Log to View...
System
Informatics
Temperature
Previous Page
Next Page
Refresh
Page Number: 1
TimeStamp
ErrorLevel
Package
ErrorMessage
Wednesday,Jan 08 10:45:47,2003 error EchoFpPM Error reading frontpanel device
Wednesday,Jan 08 10:45:46,2003 error EchoFpPM Error reading frontpanel device
Wednesday,Jan 08 10:45:46,2003 error EchoFpPM Error reading frontpanel device
Wednesday,Jan 08 10:45:45,2003 error EchoFpPM Error reading frontpanel device
Wednesday,Jan 08 10:45:45,2003 error EchoFpPM Error reading frontpanel device
Wednesday,Jan 08 10:45:44,2003 error EchoFpPM Error reading frontpanel device
Wednesday,Jan 08 10:45:44,2003 error EchoFpPM Error reading frontpanel device
Wednesday,Jan 08 10:45:43,2003 error EchoFpPM Error reading frontpanel device
Wednesday,Jan 08 10:45:43,2003 error EchoFpPM Error reading frontpanel device

Figure 5-22 Log Viewer/Logs/Log Entries

5-9-4-1 Logs

The three sub-menus of the Logs category are System, Informatics and Temperature.

NOTE: *Figure 5-25 on page 33 Provides a graphical example of the log entries for the **System Logs**.*

Log table headings for the different logs are as follows:

- **System**

  Log entry headings include Time Stamp; Error Level; Package; and Error Message.

- **Infomatics**

  Log entry headings include TimeStamp, Revision, PtID, PtDOB, PtSex, PtWeight, PtHeight, ExamID, Exam Category, ExamCurDate, and ExamStartTime.

- **Temperature**

  Log entry headings include Time Stamp; Error Level; Package; Upper FEC Sensor; and Lower FEC Sensor.

5-9-4-2 Utilities

The two sub-menus of the Utilities category are Plot Log and Plot Page.

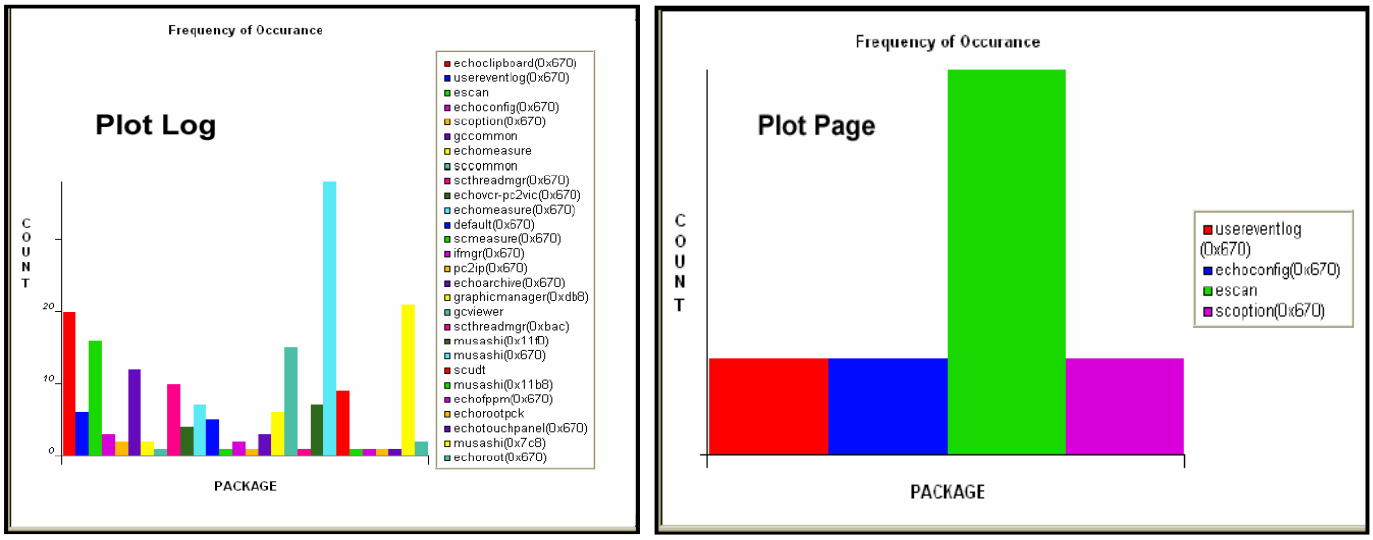


Figure 5-23 Utilities Sub-Menus

- **Plot Log**

  Allows for the color coded plot of all Log contents with the package on the ‘x’ axis and incident count on the ‘y’ axis.

- **Plot Page**

  Allows for the color coded plot of all Page contents with the package on the ‘x’ axis and incident count on the ‘y’ axis.

5-9-4-3 Search

On the **Text Search** sub-menu of the Search category, users enter case-sensitive text they wish to find. This filter field works well for filtering the Sys log file for the word fail.

Figure 5-24 Search Category

5-9-4-4 Exit

The sub-menu, **Exit Log Viewer**, returns the user to the Service Desktop home page.

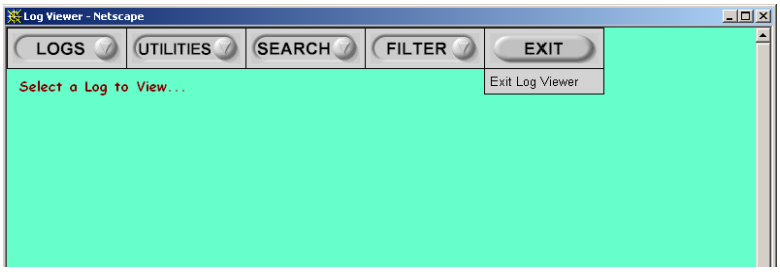


Figure 5-25 Exit Log Sub-Menu

5-9-5 Diagnostics

Detailed ***Diagnostic*** information is found in Chapter 7 Diagnostics/Troubleshooting.

5-9-5-1 Diagnostics Execution

Diagnostic tests are executable by both local and remote users. The Service Platform provides top-level diagnostic selection based on the user's level and login access permissions. Remote access will require disruptive diagnostic permissions to run Acquisition diagnostics.

5-9-5-2 Diagnostic Reports

Diagnostic tests return a report to the Service Platform. The platform retains the report and allows for future viewing of the diagnostic logs.

5-9-5-3 Proactive Diagnostics

A system of self-monitoring is largely supported with the integration of *iLinq*. The scheduler, executive, user interfaces, and some of the proactive diagnostic functions are provided by *iLinq*. Other tasks will need to be provided by the product team.

5-9-6 Image Quality

The Image Quality page is intended to contain tools for troubleshooting image quality issues.

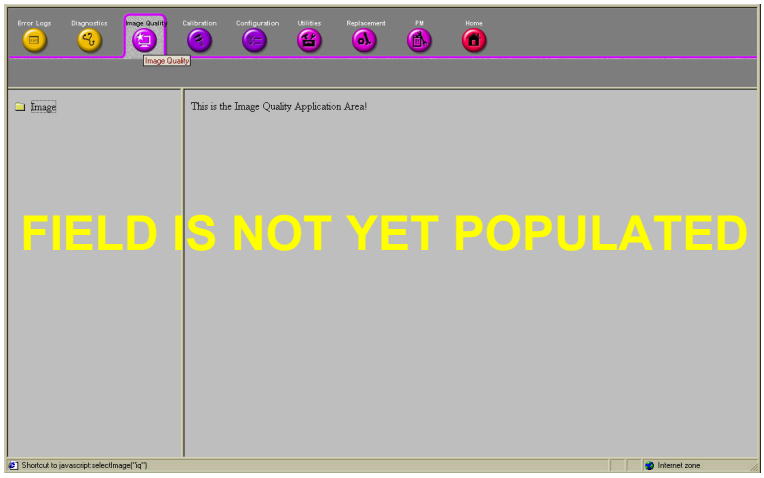


Figure 5-26 Image Quality Page

5-9-7 Calibration

The Calibration page is intended to contain the tools used to calibrate the system

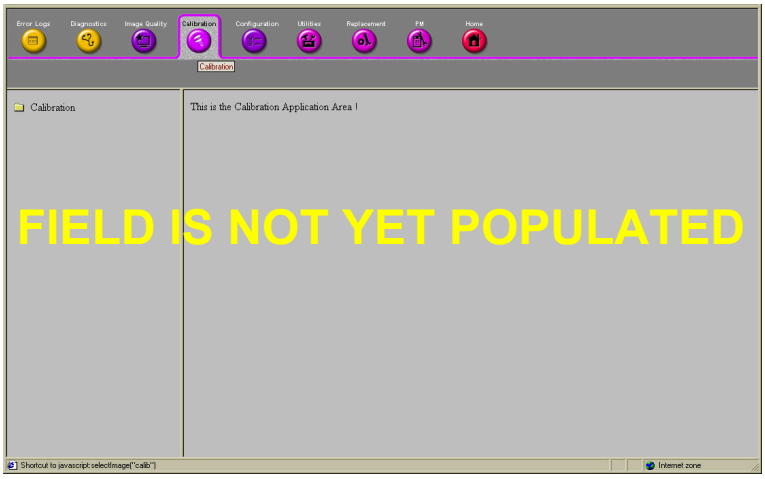


Figure 5-27 Calibration Page

5-9-8 Configuration

The Configuration page is used to setup various configuration files on the system.

The Service Platform is the access and authorization control for remote access to the configuration subsystem.

The enable/disable of software options can be done from this Configuration page.

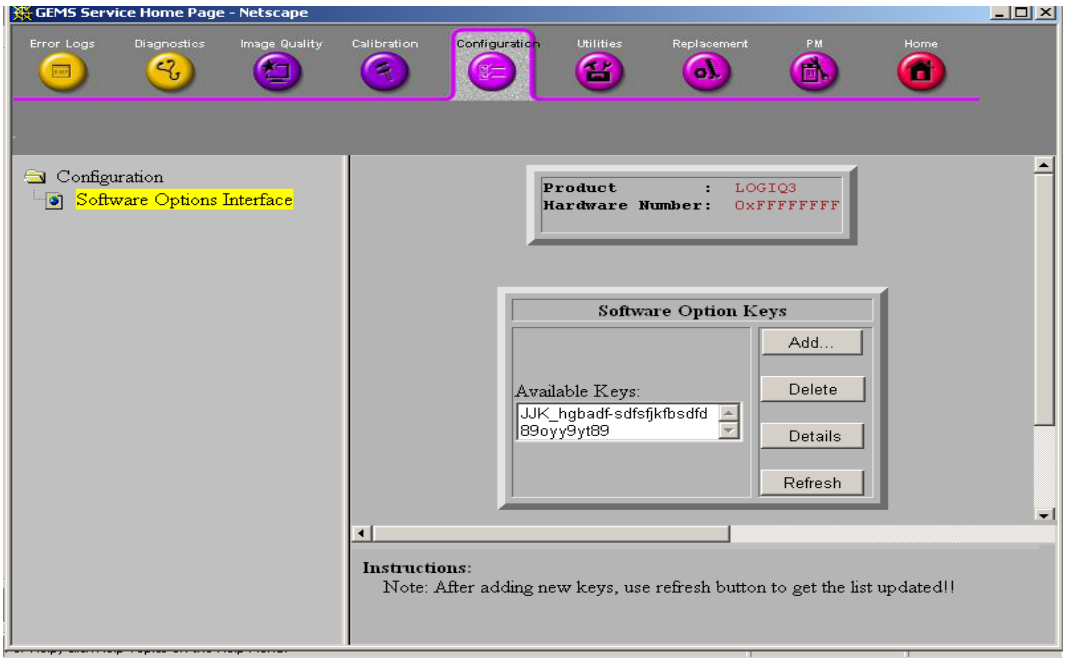


Figure 5-28 Configuration Page

5-9-9 Utilities

The Utilities page contains several miscellaneous tools.

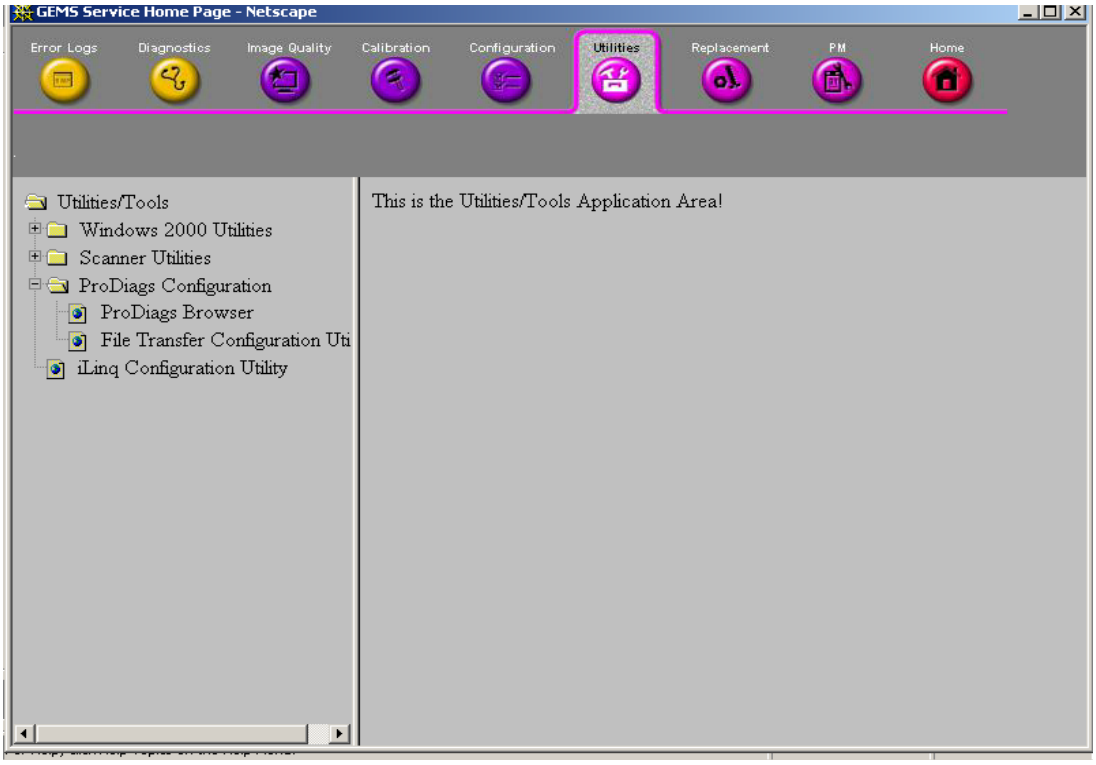


Figure 5-29 Utilities Page

5-9-10 Replacement

The Replacement page intended to contain the tools used to track replacement parts used in the system.

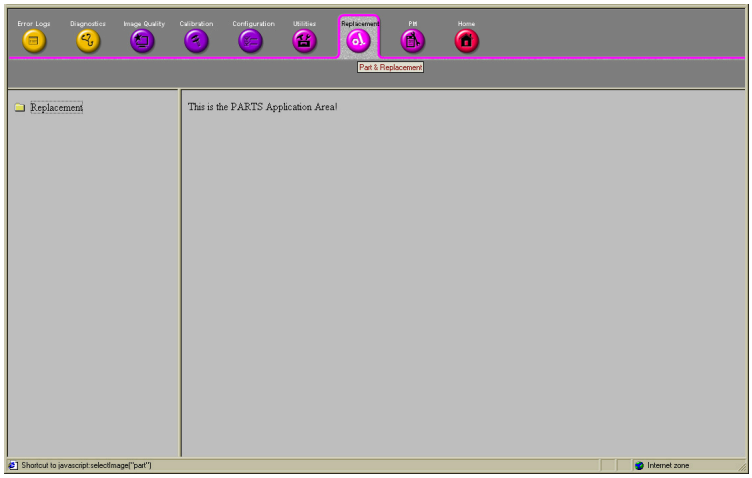


Figure 5-30 Part Replacement Page

5-9-11 PM

The **PM** page is intended to contain the tools used in periodic maintenance of the system.

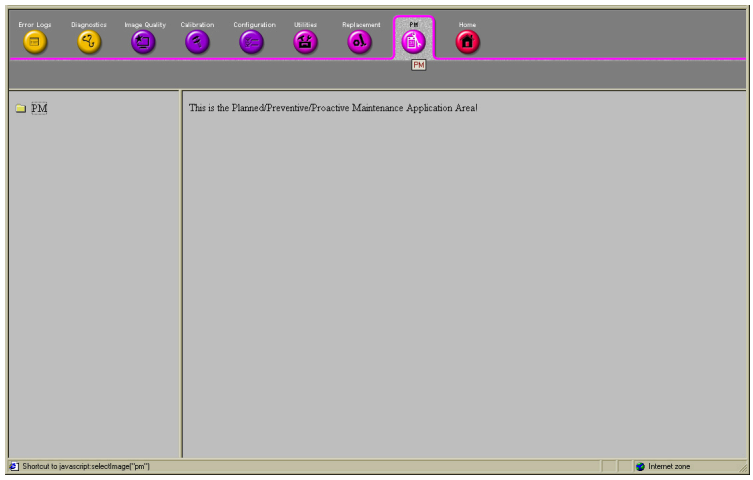


Figure 5-31 Planned Maintenance Page

This page was intentionally left blank.

Chapter 6
Service Adjustments

Section 6-1
Overview

6-1-1 Purpose of Chapter 6

This chapter describes how to test and adjust the mechanical capabilities of a scanner that may be out of specification. Although some tests may be optional they should only be performed by qualified personnel.

Table 6-1 Chapter 6 Contents

Section	Description	Page Number
6-1	Overview	6-1
6-2	Regulatory	6-1
6-3	Power Supply Adjustments	6-1
6-4	Monitor Adjustment	6-4

Section 6-2
Regulatory

Verify, where applicable, that any regulatory information or tests required by national law are present and accounted for, and any regulatory tests required by national law are performed *and* documented.

Section 6-3
Power Supply Adjustments

This system contains three power supply modules; HV unit, LV unit, and ATX PS. However, the LV unit only can be adjusted.

1.) Power ON. Wait for about 30 seconds to warm up the console.
2.) For each of the VR's, connect a DVM to the appropriate place shown.
3.) Verify that the voltages are as shown in the table 6-3 on the test points in the Transmit and Recieve Board..

6-3-1 Access to Adjustments for LV Power Supply

1.) Remove the left side cover.
2.) Remove the LV unit cover.
3.) Remove the screws, then pull out the LV unit Assy with the cables connected.

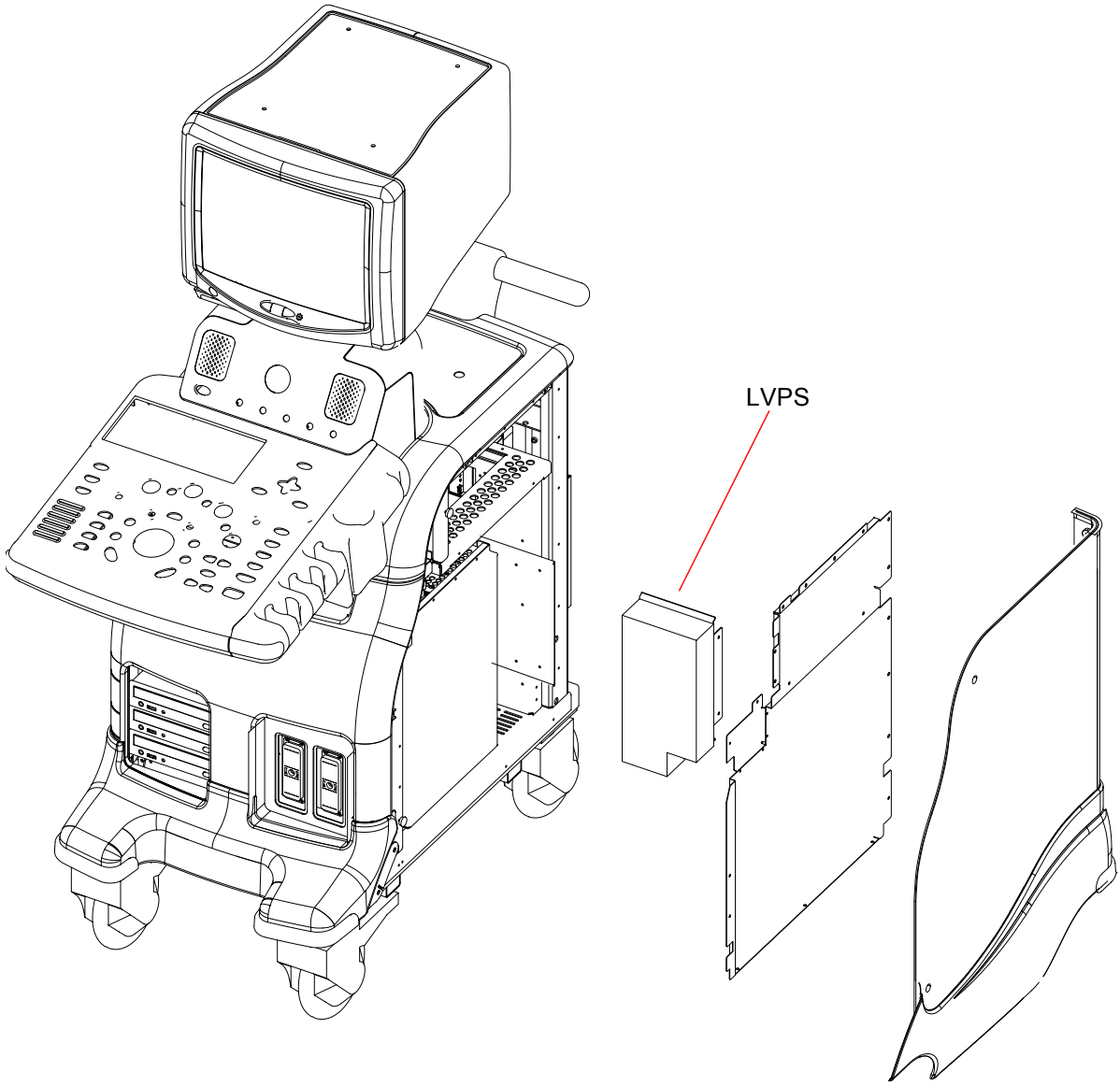


Figure 6-1 LV Power Supply

6-3-2 Adjustments Procedures

1.) Using the following VR's, DC output can be adjusted

NOTE: Using DMM Check if the voltage settings are within spec, if not do adjustment as per table below.

Table 6-2 DC Output Specification for LV Unit

VR	Specifications	PCB Name	Test Point
VR1	3.3V +/- 34mV	TXB	3.3VD
VR2	5V +/- 100mV	TXB	+5VD
VR3	5V +/- 100mV	RXB	+5VA
VR4	-5 V +/- 100mV	RXB	N5VA
VR5	12V +/- 120mV	TXB	+12VA
VR6	-12V +/- 120mV (non adjustable)	TXB	N12VA

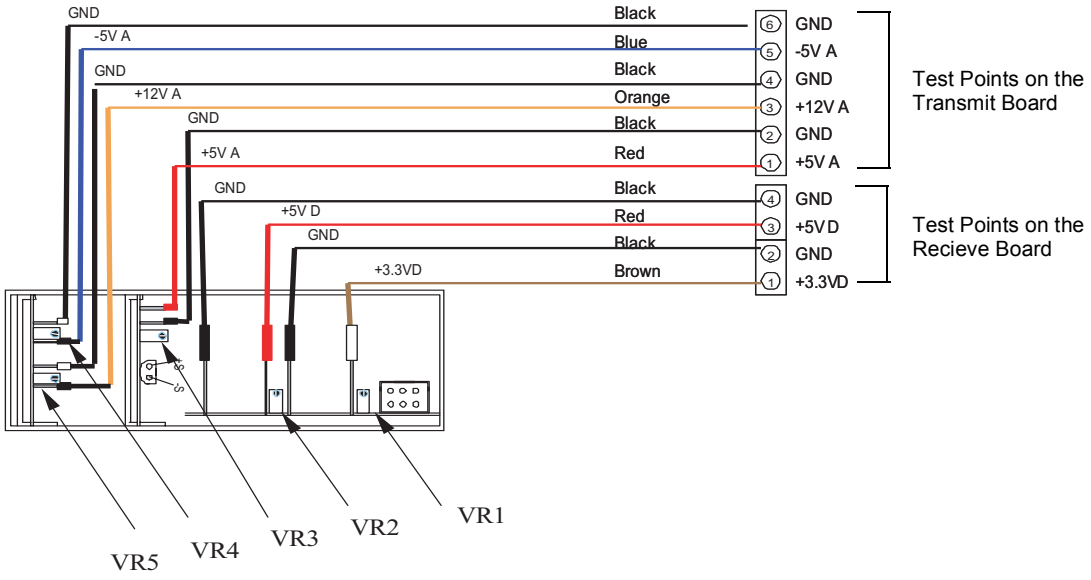


Figure 6-2 VR's for Adjusting DC Output

NOTE: Voltages can also be measured on test points provided in PCB Assembly by removing nest EMI

Section 6-4
Monitor Adjustment

This helps to adjust the settings of the Contrast and the Brightness on the CRT Monitor suitably.

The Monitor Adjustment button is displayed as shown.

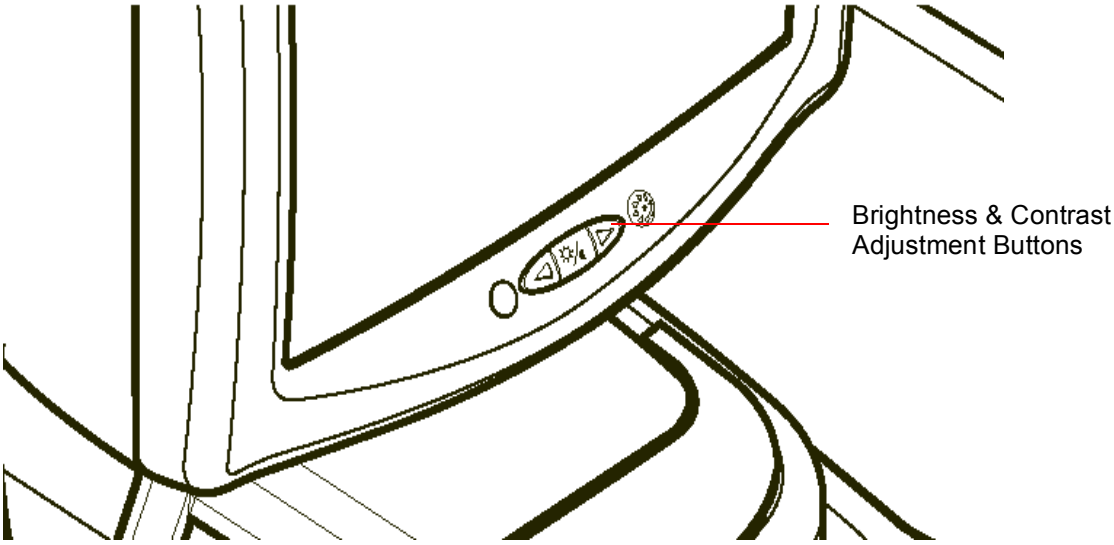


Figure 6-3 Monitor Adjustment

1.) Press The Toggle Button for contrast & brightness. Confirm that the Contrast (or brightness) indicator is displayed on the monitor. If the brightness is displayed, press the toggle button again.
2.) Press the adjustment button (+/2/>) to increase contrast (or brightness)
3.) Press the Adjustment button (-/2/<) to decrease contrast (or brightness).
The amount of contrast (or brightness) is shown on a slide bar on the screen. Refer the following table for the setting.

Table 6-3 Contrast and Brightness Recommended Setting

Room Condition	Monitor Adjustment	
	Contrast	Brightness
Dark room	**50**	40
Dim room	**60**	35
Bright room	**70**	30
room for Cardiology	**80**	20

Record the final brightness and contrast settings and leave this information withe the system. Generally speaking, do not change the controls once they have been set, the display becomes the reference for the hard copy device(s).

After readjusting the monitor's Contrast and Brightness, readjust all preset and peripheral settings.

Chapter 7
Diagnostics/Troubleshooting

Section 7-1
Overview

7-1-1 Purpose of Chapter 7

This section describes how to setup and run the tools and software that help maintain image quality and system operation. Very basic host, system, and board level diagnostics are run whenever power is applied. Some Service Tools may be run at the application level. However most software tests are required.

Table 7-1 Contents in Chapter 7

Section	Description	Page Number
7-1	*Overview*	7-1
7-2	*Gathering Trouble Data*	7-2
7-3	*Screen Captures*	7-4
7-4	*Diagnostics*	7-8
7-5	*Common Diagnostics*	7-13

7-1-2 Diagnostic Procedure Summary

Although Diagnostics can be run in any order, the *Bottom-up Confidence-Building Order* is outlined in this section:

- Provides a framework from which overall diagnostic testability can be determined.
- Provides a top-level model that describes the confidence-building aspect of the diagnostics.
- Provides a logical step-by-step approach to system check-out and fault isolation.

There are two levels of diagnostic: board-level and system level.

- Board-level diagnostics are intended to test functionality of a single circuit board.
- System-level diagnostics are intended to test functionality on more than one circuit board.

Unused system components (board or signals) for each diagnostic test are drawn in gray (ghosted).

NOTE: In this document, the Host includes all hardware upstream of the PCI cable. The diagnostics in this chapter do NOT test anything upstream of the PCI cable. Therefore, any upstream hardware or software must be functional before running these diagnostics.

Section 7-2
Gathering Trouble Data

7-2-1 Overview

There may be a time when it would be advantageous to capture trouble images and system data (logs) for acquisition through remote diagnostics (InSite) or to be sent back to the manufacturer for analysis. There are different options to acquire this data that would give different results.

7-2-2 Collect Vital System Information

The following information is necessary in order to properly analyze data or images being reported as a malfunction or being returned to the manufacturer:

- Product Name = LOGIQ™ 3

From the *Utility>System>About* screen:

Applications Software

- Software Version
- Software Part Number

System Image Software

- Image Revision
- Image Part Number

7-2-3 Collect a Trouble Image with Logs

If the system should malfunction, press the Alt-D keys simultaneously. This will collect a screen capture of the image monitor, system presets and the following logs:

- Keyboard Shadow Log
- Error Logs
- Crash Log
- Power Supply
- Temperature

NOTE: Power Supply are not currently being updated by the LOGIQ™ 3.

This Alt-D function is available at all times.

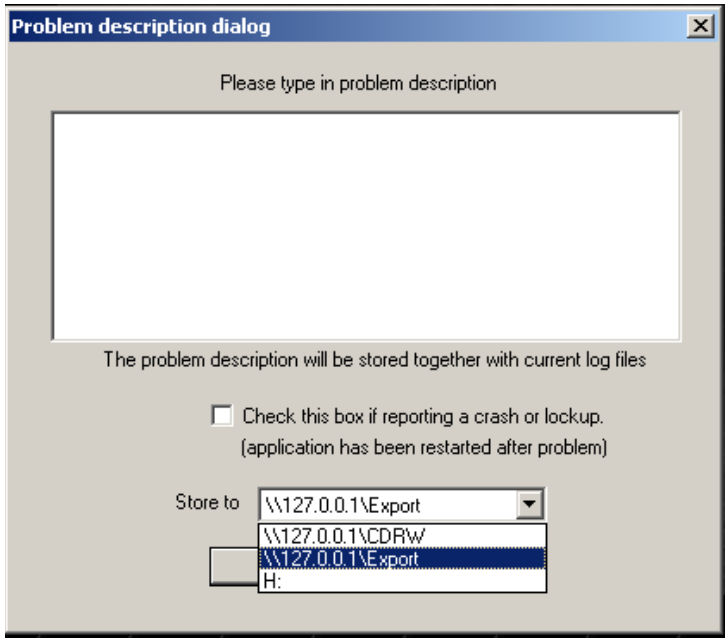

Problem description dialog
Please type in problem description
The problem description will be stored together with current log files
Check this box if reporting a crash or lockup.
(application has been restarted after problem)
Store to
\\127.0.0.1\Export
\\127.0.0.1\CDRW
\\127.0.0.1\Export
H:

Figure 7-1 ALT-D Dialog Box

When Alt-D is pressed, a menu box appears that allows for:

- A place to enter a description of the problem
- A choice to store to a pre-formatted MOD (H: drive), CD-RW or to the *Export* directory D: drive (for remote viewing through InSite).

*NOTE: You **MUST** select H: or CD-RW as the destination device if it is to be different than the default Export directory on the hard drive. Choose the H: drive which is the MOD or the CD-RW.*

The subsequent file is compressed and time stamped. The screen capture is a bitmap which eliminates the possibility of artifacts from compression.

Section 7-3
Screen Captures

There may be times when the customer or field engineer will want to capture a presentation on the screen so it may be recovered by the OnLine Center through InSite. This is accomplished by first saving the image(s) to the clipboard using a Print Key.

The P4 key is the factory default print key to accomplish a secondary screen capture. However, the default is for the video area only or the customer may have customized the P4 Key function. Therefore, screen capture should involve the following steps:

1.) Check and record any custom settings for the Print4 button.
2.) Set the Print4 button to Whole Screen, Secondary Capture.
3.) Capture the required screens to the Hard Drive, MOD or CD-R.
4.) Restore the Print4 button to it's original settings.

7-3-1 Check and Record the P4 Key Function

Check the function of the Print 4 Key in the event that the customer may have made some custom settings.

1.) Select *Utility* from the NTPUI.
2.) Select *Connectivity* from the Utilities Menu.
3.) Select the *Buttons* tab on the Connectivity screen.
4.) In the *Button* field, select Print4.

The Connectivity/Buttons Screen will be displayed like the one shown in Figure 7-2 on page 4 .

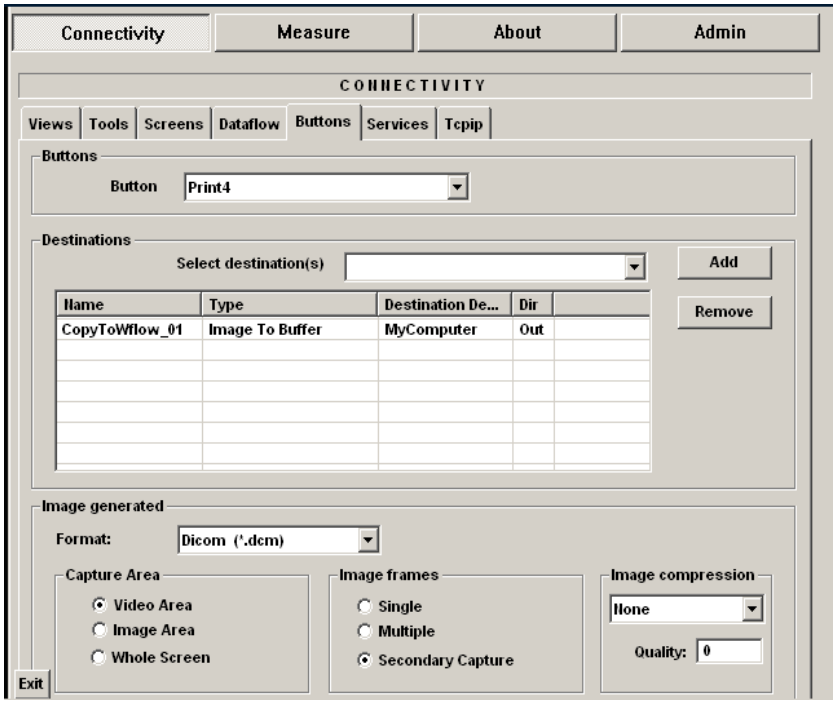


Figure 7-2 Buttons Set Up Screen

P4 is the factory default Screen Capture Key. If it is not set to Whole Screen or Screen Capture, as shown in Figure 7-2, proceed to step 5 to record the customer's custom settings.

7-3-1 Check and Record the P4 Key Function (cont'd)

5.) In the *Destinations* section, record the service that is displayed. The destinations list displays the following information:

* Name: user defined during service configuration
* Type: the type of service
* Destination Device: the device for which the service was configured
* Dir: direction: output, input, or both (I+O)

6.) In the *Image generated* section, record the parameters related to the service.

7-3-2 Setting the P4 Key to Screen Capture

If the P4 Key is not set to screen capture:

1.) While on the Connectivity screen, with the Buttons tab displayed, go to the drop down selection menu in the *Destinations* section.

2.) From the drop down menu select *CopyToWflow_01>Image to Buffer>MyComputer>Out*.

3.) Ensure that the *Image generated* section for capture Area is set to Whole Screen, secondary Capture and No Image Compression.

4.) The P4 Key should now be set up for whole screen capture, sending the screens to the image buffer (clipboard).

7-3-3 Capturing a Screen

The following is a generic process to capture any screen from the scanner:

1.) Navigate to and display the image/screen to be captured.

2.) Press **P4**. This will place a snapshot of the screen on the "clipboard" displayed at the bottom of the scan image display.

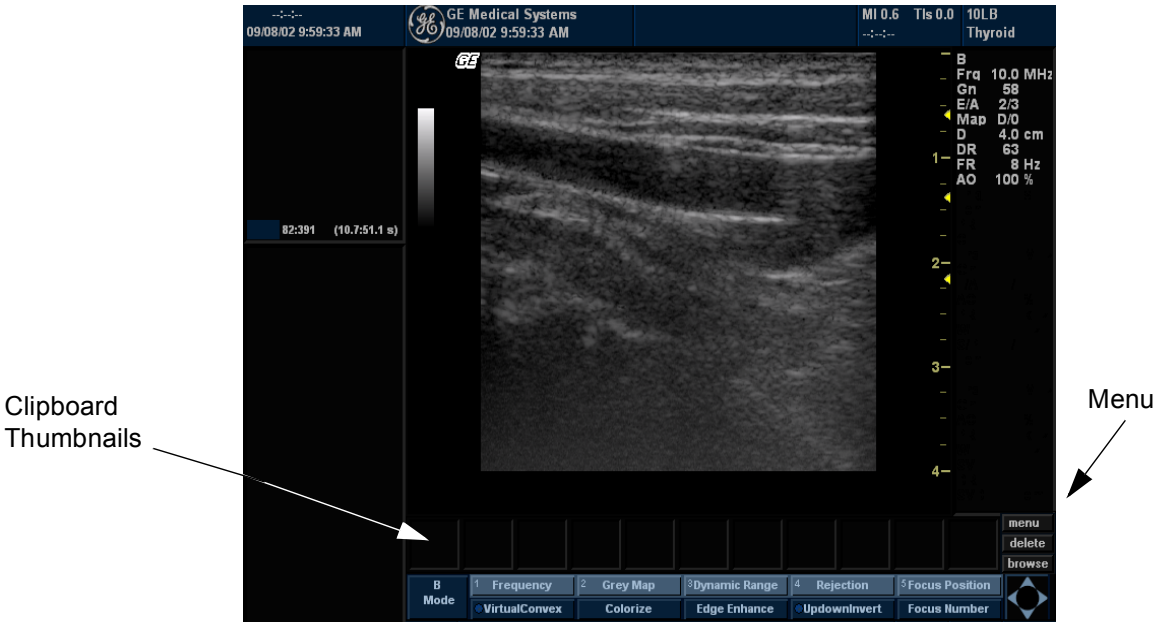


Figure 7-3 Select Image to Capture

3.) Highlight the snapshot to be stored to the system hard drive, MOD or CD-R.

4.) Select Menu on the right side of the image screen, then highlight and select SAVE AS.

Figure 7-4 Menu > Save As

7-3-3 Capturing a Screen (cont'd)

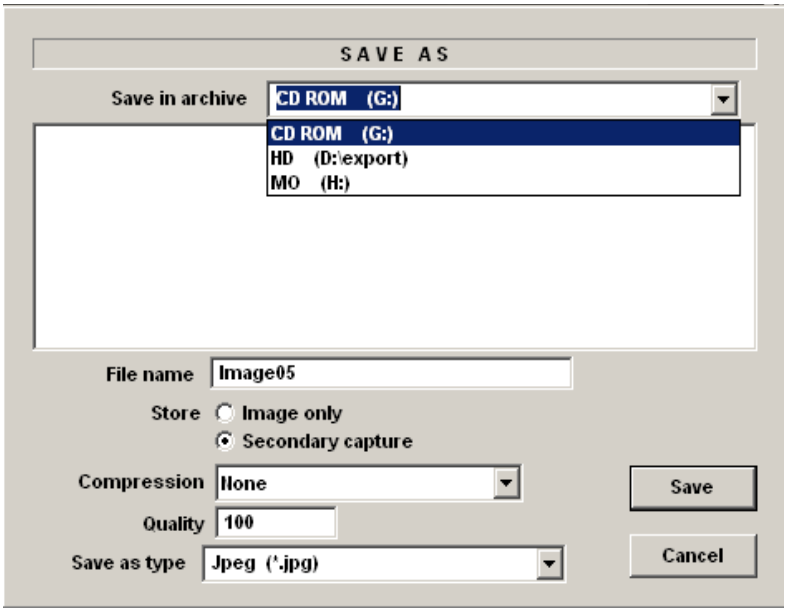


Figure 7-5 Save Dialog Box

5.) A Save dialog box will be opened. Choose *d:\export folder* as the archive location to save the image on the hard disk, MOD or CD-R.

7-3-4 Reset the P4 Key to Customer's Functionality

If the customer had programmed the P4 Key to a function other than screen capture, restore that functionality recorded in section 7-3-1 on page 4. Refer to Figure 7-2.

1.) Select *Utility* from the NTPUI.
2.) Select *Connectivity* from the Utilities Menu.
3.) Select the *Buttons* tab on the Connectivity screen.
4.) In the *Button* field, select Print4.
5.) In the *Destinations* section, select the service(s) recorded in step 5, Section 7-3-1. The destinations list displays the following information:
   * Name: user defined during service configuration
   * Type: the type of service
   * Destination Device: the device for which the service was configured
   * Dir: direction: output, input, or both (I+O)

NOTE: Only output services can be associated to the print keys.

6.) In the *Image generated* section, select the parameters related to the service recorded in step 6, Section 7-3-1.

Section 7-4
Diagnostics

As described in Chapter 5 - Components and Functions (Theory), the overall service platform uses a web-based user interface (UI) to provide access to common service components.

The Diagnostic home page displays a listing of test categories consisting of Common Diagnostics and LOGIQ™ 3 Diagnostics. Expand the desired main category to select groups or individual tests.

Acquisition Diagnostics is one of three main headings under the GSUI Diagnostics Tab.

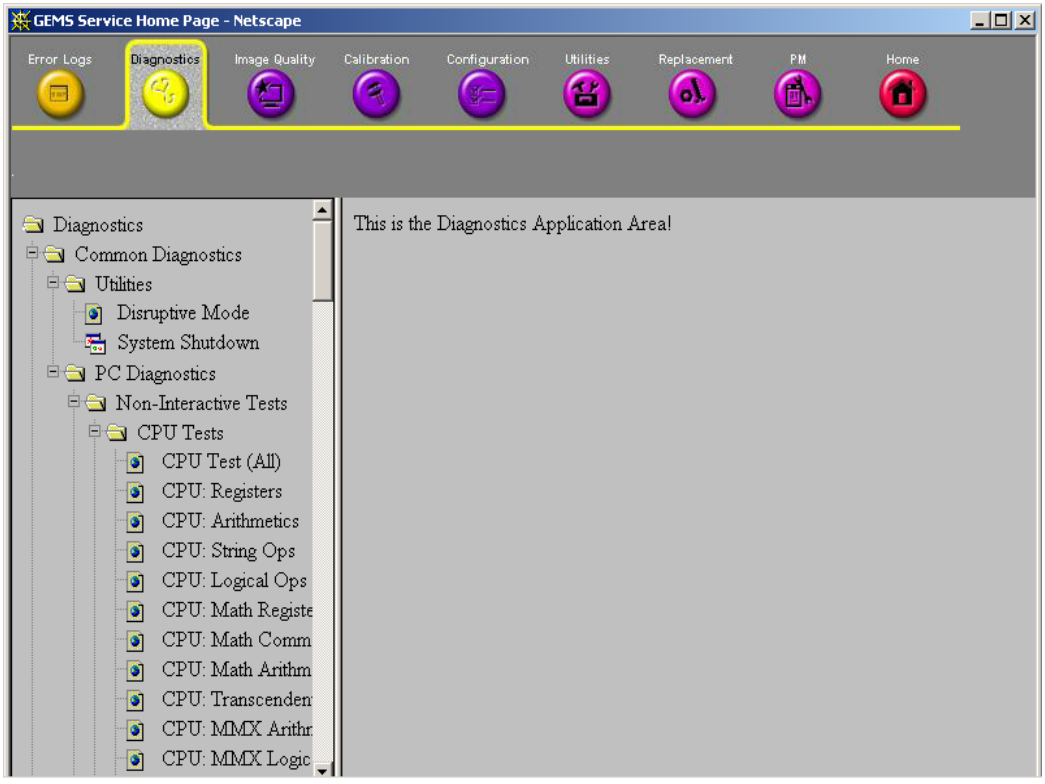


Figure 7-6 User Acquisition Diagnostics

Individual selections run diagnostics and return status information identifying any problems.

When you select a test to run, the display changes as shown in Figure 7-10 on page 11 .

1.) Instructions Frame
   - Displays either a test-specific text or the default instructions.

2.) Status Frame
   - Initially displays the last known status for a selected diagnostic. Once the diagnostic starts, the frame displays the “current” status of all test results.
   - The Status Frame also contains the user interface elements used for Diagnostic Control and Operator Feedback.

3.) Execute Button
   - This switch has two modes - each with appropriate text:
   - Execute - to start the diagnostic
   - Abort - to stop a diagnostic

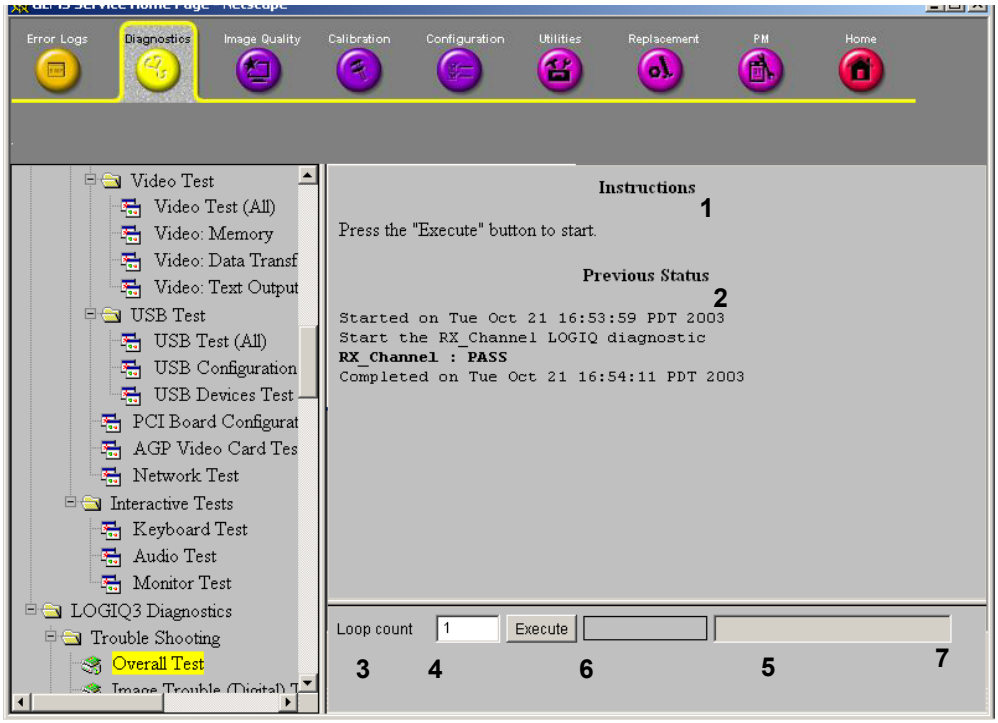


Figure 7-7 Diagnostic Selected

4.) Loop Count

- This is an editable text field that will only accept numeric values of 4 digits or less. When the switch is configured as an “execute” switch and pressed, the loop count field will be queried to determine the number of times to execute the diagnostic.

5.) Progress Indicator

- Displays a graphical progress indicator for the user.

6.) Short Text Message

- Displays brief messages about the test’s progress during execution.

7.) Status Frame Background Color

- Initially gray, the Status Frame background color changes upon completion of a diagnostic to indicate completion status.
- Code Status Fail = Red
- Code Status Pass = Green
- Code Status Executing = Yellow
- Code Status neither Pass nor Fail (Example: Aborted) = Gray (default color).

Section 7-5
Common Diagnostics

7-5-1 Utilities

Table 7-2 Utilities Mode

Items	Descriptions
Disruptive	**Enable:** The disruptive diagnostic mode is ON and the other PC connected to the scanner via network can operate the scanner remotely for troubleshooting.
System Shut Down	N/A

7-5-2 PC Diagnostics (Non-Interactive Tests)

The non-interactive or interactive PC Diagnostic tests are automatically executed only by clicking the following menu. The test log, displayed at the status frame, reports all diagnostic test results, the testing time, and testing date.

7-5-2-1 CPU Tests

7-5-2-2 Hard Drive Tests

7-5-2-3 Memory Tests

7-5-2-4 CD-ROM Drive Tests

7-5-2-5 Video Test

7-5-2-6 USB Test

7-5-2-7 PCI Board Configuration Test

7-5-2-8 Keyboard Test

7-5-2-9 Audio Test

NOTE: **Monitor Test Double***On Systems with Transmit Board 2318124-2 , the TPG2 Test will fail, even if the ASIC is working fine. This test should be Neglected on system with the Transmit board 2318124-2.*

7-5-2-10

This page was intentionally left blank.

Chapter 8
Replacement Procedures

Section 8-1
Overview

8-1-1 Purpose of Chapter 8

This chapter describes replacement procedures for the following modules and subsystems.

Section	Description	Page Number
8-1	Overview	8-1
8-8	Software Loading Procedure	8-72
8-10	Loading Application Software After a Base Image Load	8-87
8-11	Upgrading Application Software	8-100

Table 8-1 Contents in Chapter 8

8-1-2 Returning/Shipping Probes and Repair Parts

Equipment being returned must be clean and free of blood and other infectious substances.

GEMS policy states that body fluids must be properly removed from any part or equipment prior to shipment. GEMS employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstance should a part or equipment with visible body fluids be taken or shipped from a clinic or site (for example, body coils or an ultrasound probe).

The purpose of the regulation is to protect employees in the transportation industry, as well as the people who will receive or open this package.

NOTE: The US Department of Transportation (DOT) has ruled that "items that were saturated and/or dripping with human blood that are now caked with dried blood; or which were used or intended for use in patient care" are "regulated medical waste" for transportation purposes and must be transported as a hazardous material.

WARNING ***ONLY QUALIFIED SERVICE PERSONNEL SHOULD REMOVE ANY COVERS OR PANELS. ELECTRICAL HAZARDS EXISTS AT SEVERAL POINTS INSIDE. BECOME THOROUGHLY FAMILIAR WITH ALL HAZARDOUS VOLTAGES AND HIGH CURRENT LEVELS TO AVOID ACCIDENTAL CONTACT***

CAUTION **Do not wear the ESD wrist strap when you remove a part of power supply unit. Turn OFF power and unplug the power cord before removing a part of power supply unit. However be sure to turn off power and wear the strap before you remove a circuit boards.**

1.) Unscrew the seven screws (1-7) and remove the side cover.

2.) Remove the FRC and the Power cable to the HDD (a, b) and the two screws (8, 9).

3.) Slide out the HDD mounting.

4.) Remove the two screws marked(10, 11 and 12, 13) on each side of the HDD mounting and remove the HDD.

5.) Replace this HDD.

8-1-2-1 Mounting Procedure

1.) Replace the parts in the order of removal

.8-6-5 Hard Disk Drive (FRU no. 702)(contd.)

Figure 8-1 HDD Replacement

8-1-3 Compact Disc Read Write Drive (FRU no. 702)

2.) Unscrew the seven screws (1-7) and remove the side cover.
3.) Remove the FRC and Power Cable to the CDRW (a, b).
4.) Unscrew the four screws (8-11) connecting the CDRW to the BEP cabinet.
5.) Pull forward and replace the CDRW.

8-1-3-1 Mounting Procedure

1.) Replace the parts in the order of removal.

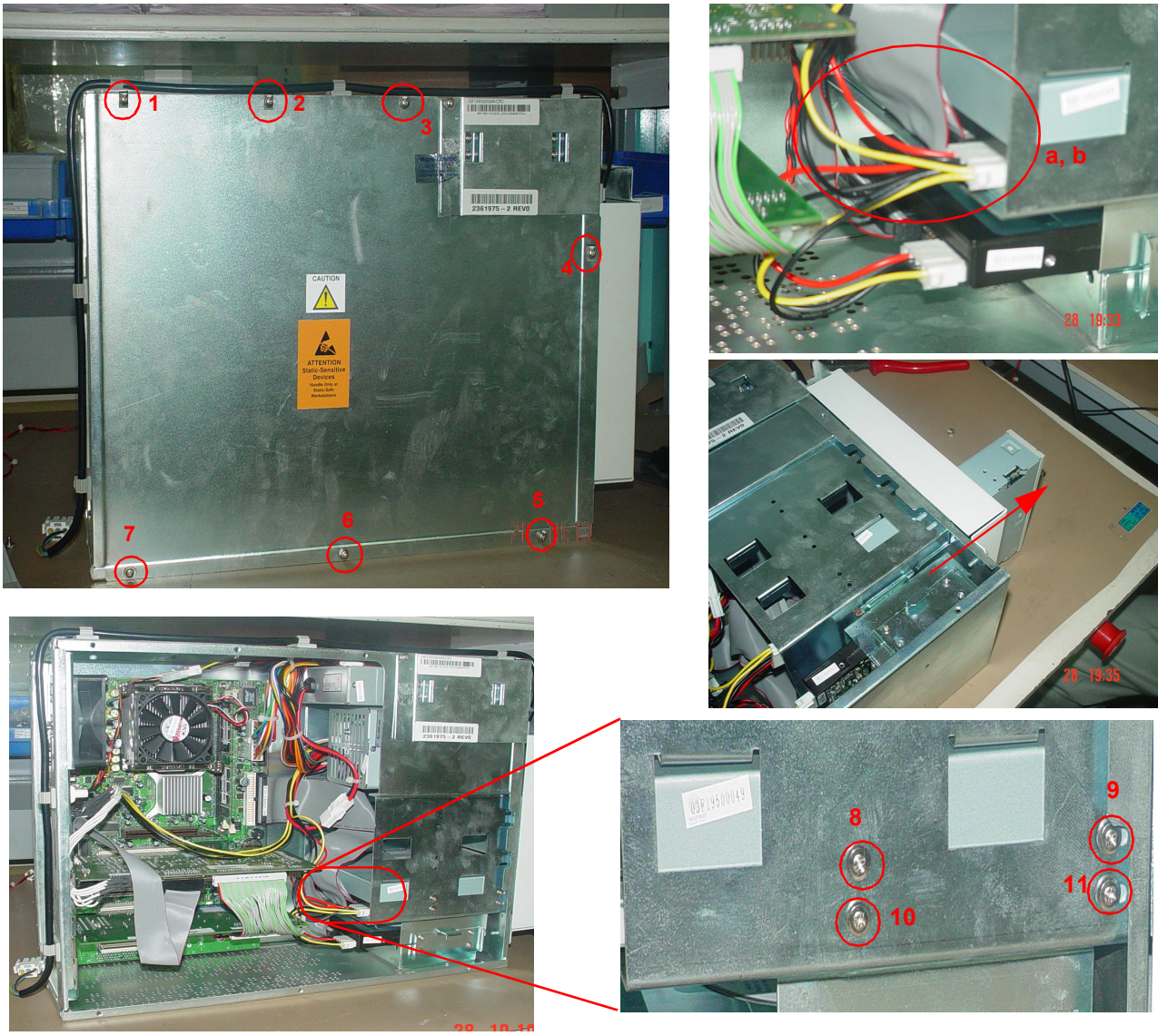


Figure 8-2 CDRW Replacement

8-1-4 BEP Power Supply (FRU no. 703)

2.) Unscrew the seven screws (1-7) and remove the side cover.

3.) Remove the cable connections as shown in the figures.

4.) Remove the BEP Front cover by removing the four indicated screws (8-11).

5.) Remove the cable from the cable clamp (a)

6.) Remove the seven screws, marked (12-18), attaching the power supply to the BEP and the four screws (19-22) attaching the battery to BEP.

7.) Replace the power supply and the battery.

8-1-4-1 Mounting Procedure

1.) Replace the parts in the order of removal.

2.) If replacement is done on BEP Ver1, close the PCI slot at the rear of the BEP.

Figure 8-3 BEP Power Supply Replacement

8-1-5 PCVIC PCB (FRU no. 704)

3.) Unscrew the seven screws (1-7) and remove the side cover.
4.) Unscrew the screw (8) of the PCVIC attaching it to the BEP.
5.) Remove the cables marked connecting to the PCVIC. Pull out the PCVIC.
6.) Replace this PCVIC using the new PCVIC

8-1-5-1 Mounting Procedure

1.) Replace the parts in the order of removal.

2.)

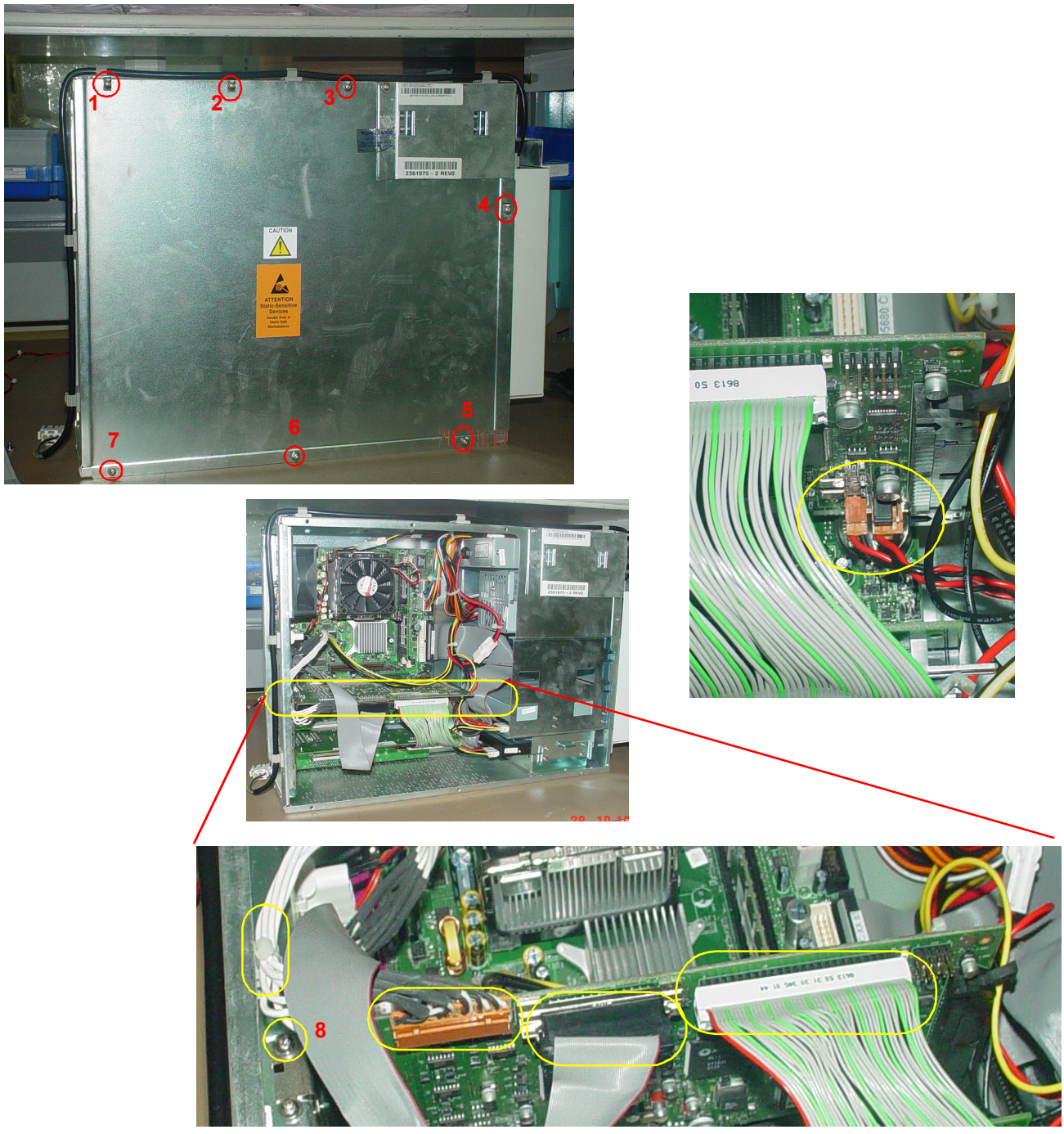


Figure 8-4 PCVIC Replacement

8-1-6 PC2IP PCB (FRU no. 706)

3.) Unscrew the seven screws (1-7) and remove the side cover.

4.) Unscrew the screw (8) and remove the cables marked. Pull out the PC2IP Card.

5.) Replace the PC2IP Card.

8-1-6-1 Mounting Procedure

1.) Replace the parts in the order of removal.

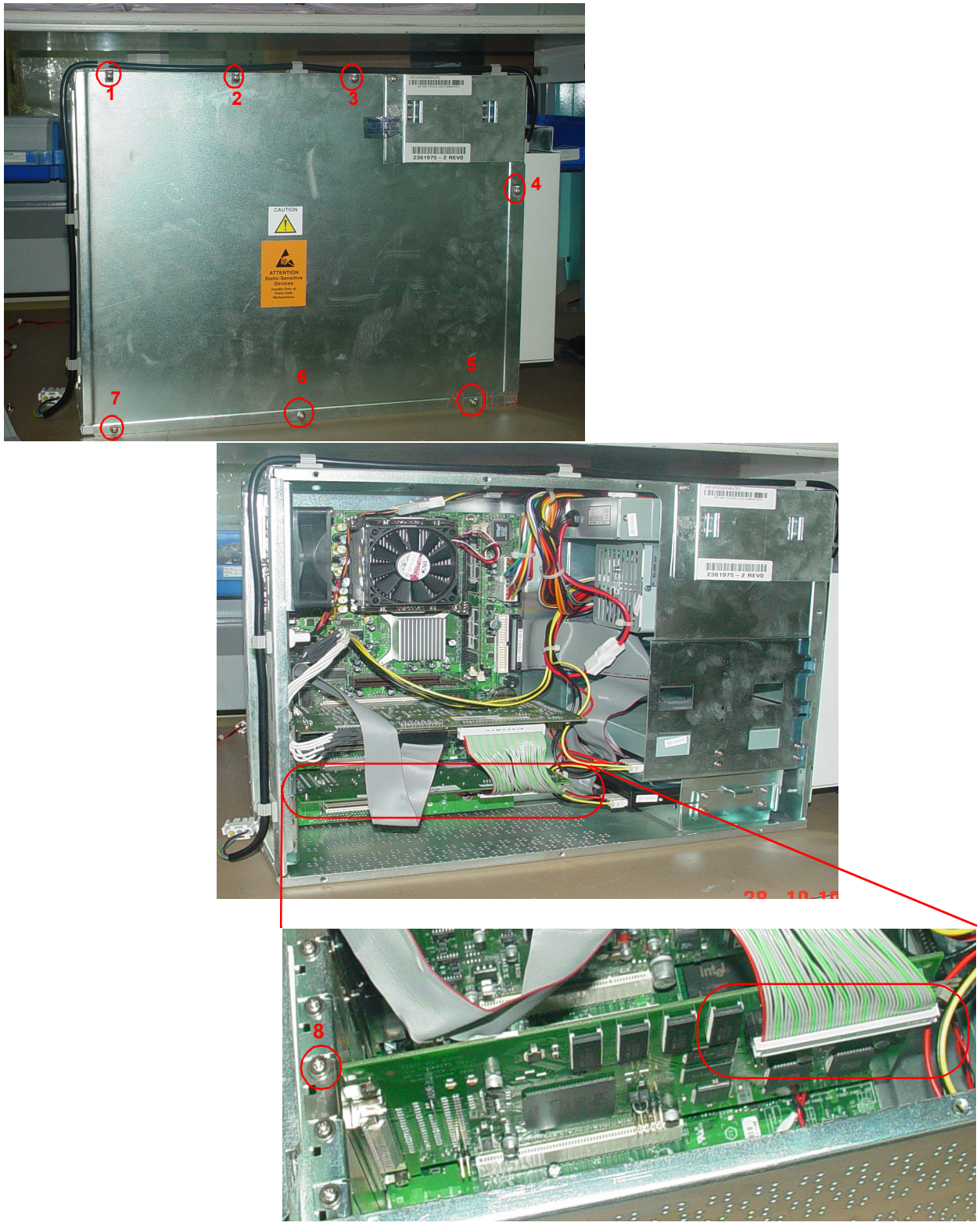


Figure 8-5 PC2IP Replacement

Section 8-2
Loading Application Software After a Base Image Load

8-2-1 Manpower

One person, .5 hour + travel

8-2-2 Tools

None

8-2-3 Preparations

Loading applications software is necessary after a Base Image Software Load.

If this is the first time for loading Applicatiopns Software (after a Base Image Load) proceed with the following process.

If this is NOT the first time for loading Applications software (just an applications update) then proceed to Section 8-11 "Upgrading Application Software" on page 8-100.

8-2-4 Image Management Guide

Save As to View on any PC - Use this to save images (Dicom or Raw Dicom) in a computer-friendly format (.avi or .jpeg) so you can view it on any PC.

Move Images to Archive - Use this to take images off your Ultrasound system on to removable media for long-term archive. This is the way to free up hard disk space, rather than deleting images.

Export/Import Data/Images Between Systems - Use this to copy both patient data and images for specified patient(s) from one system to another.

8-2-4-1 Save As (Saving Images to CD-ROM to View on Any PC)

To save images to the CD-ROM:

1.) Insert the CD.
2.) Go to Utility --> Connectivity --> Tools. Select the Media as CD Rewritable.
3.) Press Format to format the CD-ROM.
4.) Select the image(s) to be saved to CD-ROM, press Menu, and select Save As.
5.) The SAVE AS menu appears.

8-10-4-1 Save As (Saving Images to CD-ROM to View on Any PC) (cont'd)

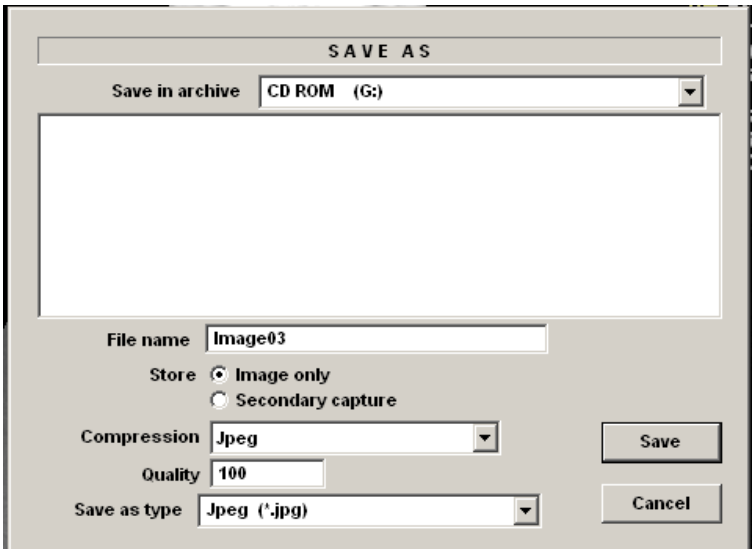


Figure 8-6 Save As Menu

6.) Specify Compression and Save As Type and press Save. The image is saved to the CD-ROM.

7.) When you have put all the images you want on the CD, press F3 to eject the CD-ROM. Select CD Rewritable.

Figure 8-7 Eject Media Menu

8.) Finalize the CD-ROM by selecting Yes. The CD-ROM is ejected from the system.

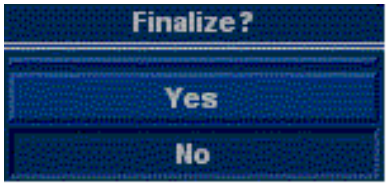


Figure 8-8 Finalize CD-ROM Menu

Storing Images with More Resolution

To store images with more resolution than is available with the JPEG selection, select Save As and select AVI as the Save As Type. You can save single images as .avi files.

8-10-4-1 Save As (Saving Images to CD-ROM to View on Any PC) (cont'd)

Table 8-2 Higher Resolution Store Options

Image Type	Store as Image Only	Store as Secondary Capture
CINE Loop	Gives you a loop of just the image (no title bar and scan information).	Gives you a single image of the video area. DO NOT DO THIS BECAUSE YOU DO NOT KNOW WHICH IMAGE FROM THE LOOP THAT YOU ARE GETTING.
Still Image	Gives you a single image (no title bar and scan information).	Gives you a single image of the video area.

8-2-4-2 Moving Images (Image Archive)

To archive images:

1.) Insert the backup media. Format the backup media, CD-ROM or MOD. Select the Utility tab on the Touch Panel. Select Connectivity, then Tools. You MUST set up a protocol for locating images on the media by labeling it consistently. The best way is to label images by date.

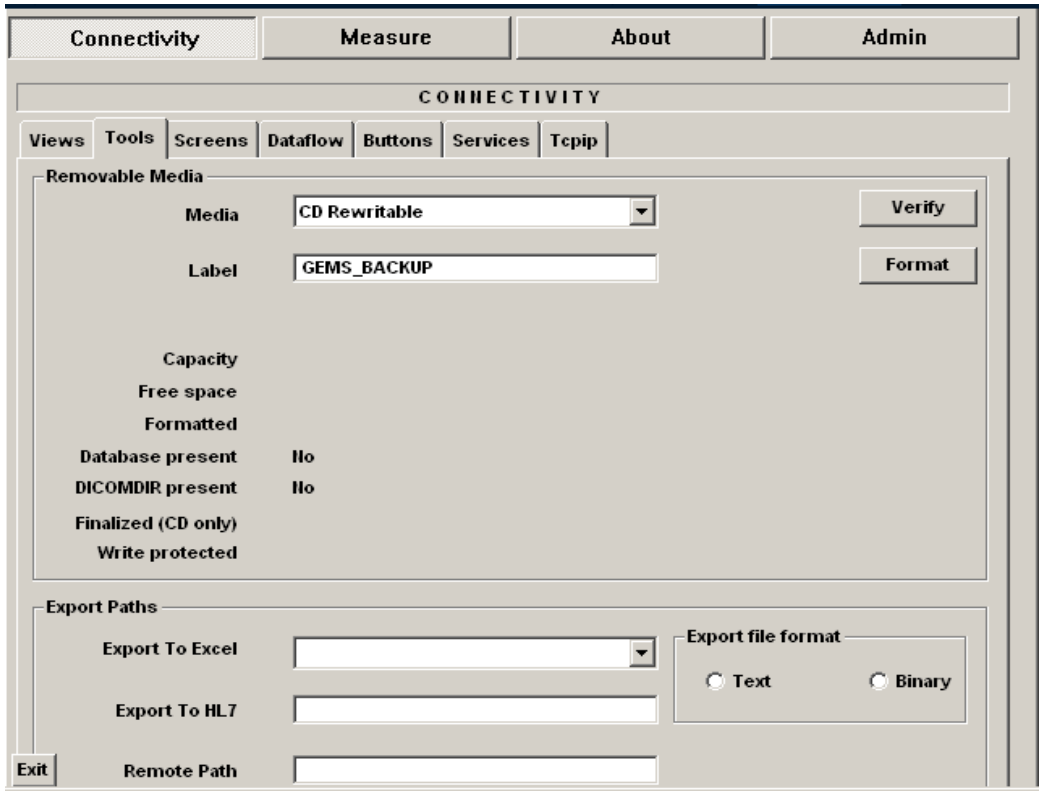


Figure 8-9 Format MOD/CD-ROM Screen

2.) Format the MOD/CD-ROM.

3.) Press Patient. Set the Dataflow to store images directly to MOD or CD-ROM - or select the Dataflow tab and select the Removable MOD or Removable CD-ROM dataflow.

8-10-4-2 Moving Images (Image Archive) (cont'd)

4.) Press More, then select Move Images. The Move Images pop-up appears.

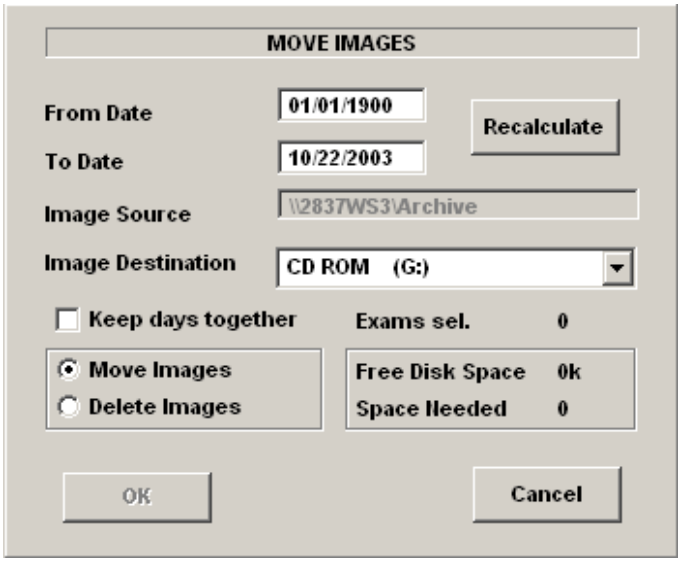


Figure 8-10 Image Archive Move Pop-up Menu

5.) Fill in the From Date, then press Recalculate. Specify to Keep days together. Check that you have enough disk space for the images you want to move. Select Move Images, then press OK. An in-progress message appears. The archive operation is complete when you receive this message.

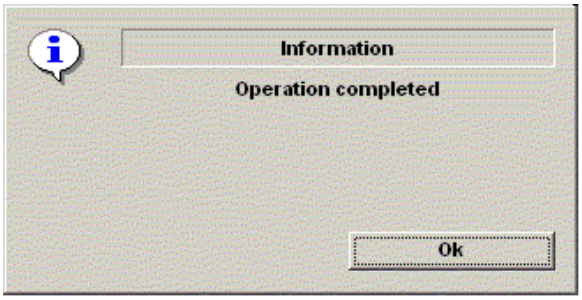


Figure 8-11 Archive Operation Complete Message

8-2-4-3 Export/Import (Moving Data Between Ultrasound Systems)

To move exams from one Ultrasound system to another, you need to export/import exam information.

NOTE: Both database information and images are exported. No data is deleted from the local archive when exporting data.

Exporting Data

To export an exam(s) to a compatible Ultrasound system:

1.) Format the removable media (MOD or CD-ROM). Label the removable media. Answer Yes/OK to the messages.
2.) Press Patient. Deselect any selected patient(s) in the search portion of the Patient screen. Press More (located at the lower, right-hand corner of the Patient menu).
3.) Select Export. Specify the type of removable media (MOD or CD-ROM) on the Export pop-up. Press OK. Then, please wait until the Patient menu is visible.

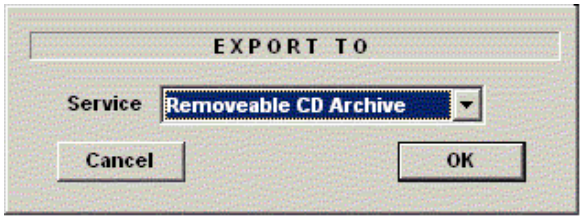


Figure 8-12 Export Pop-up Message

4.) In the patient list at the bottom of the Patient menu, select the patient(s) you want to export.

You can use Windows commands to select more than one patient.

To select a consecutive list of patients, click the cursor on the first name, move the cursor to the last name, then press and hold down the Shift+right Set key to select all the names.

To select a non-consecutive list of patients, click the cursor at the first name, move the cursor to the next name, then press and hold down the Ctrl+right Set key, move the cursor to the next name, then press and hold down the Ctrl+right Set key again, etc.

You can also search for patients via the Search key and string.

Or, Select All from the Select All/Copy Patient Menu:

8-10-4-3 Export/Import (Moving Data Between Ultrasound Systems) (cont'd)

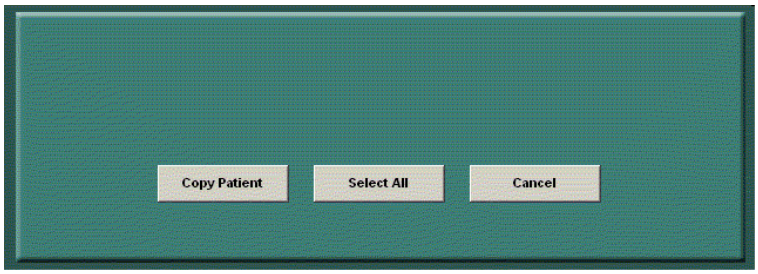


Figure 8-13 Select All/Copy Patient Menu

NOTE: You need to use your best judgment when moving patients' images. If there are lots of images or loops, then only move a few patients at a time.

5.) Once you have selected all of the patients to export, press Copy Patient from the Select All/ Copy Patient Menu.

6.) Informational status messages appear as the copy is taking place. A final status report pop-up message appears. Press OK.

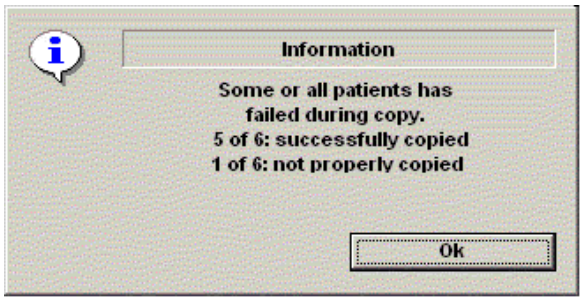


Figure 8-14 Export Completion Status Message

7.) Press F3 to eject the media. Specify that you want to finalize the CD-ROM.

8-2-4-4 Importing Data

To import an exam(s) to another Ultrasound system:

1.) At the other Ultrasound system, insert the MOD or CD-ROM.
2.) Press Patient, press More, then Import. The Import from pop-up message appears. Press OK.

Figure 8-15 Import Pop-up Message

3.) The Patient menu just shows the patients available for import from the removable media you just loaded onto the system.
4.) Select the patients to be imported.
5.) Press Copy Patient from the Select All/Copy Patient menu.
6.) Please wait for the patient information to be copied to this Ultrasound system. Informational messages appear while the import is taking place.
7.) Press F3 to eject the media.

8-2-5 Loading Applications Software

1.) Place the “Application Software” CDROM into the CDROM drive.
2.) Press the Start button on the tool bar at the bottom of the LCD screen and select “**Run…**”.

Enter “**g:\LoadSoftware**” into the dialog box as shown in Figure 8-83.

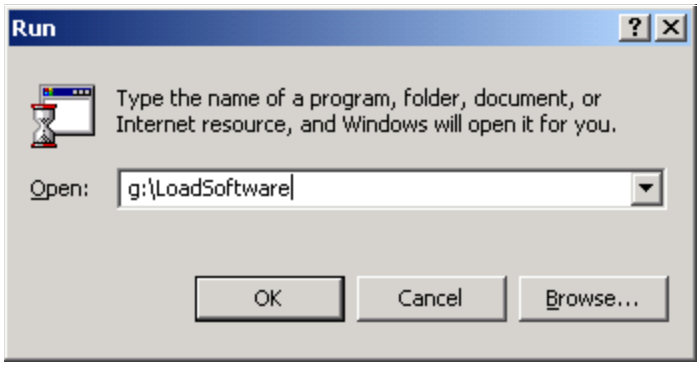


Figure 8-16 Run Load Software

3.) You will see a screen that warns you that you are about to load software, press the Enter key or select OK to start the process.
4.) You will see a Command (CMD) window open as shown in Figure 8-84.

8-10-5 Loading Applications Software (cont'd)

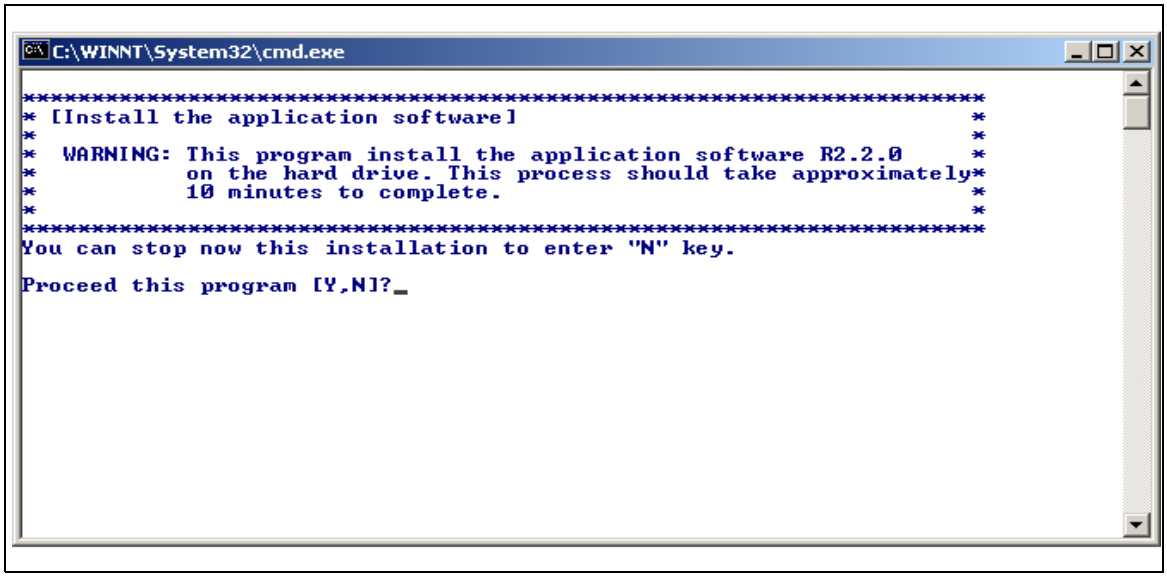

C:\WINNT\System32\cmd.exe
****
* [Install the application software] *
* *
* WARNING: This program install the application software R2.2.0 *
* on the hard drive. This process should take approximately*
* 10 minutes to complete. *
* *
****
You can stop now this installation to enter "N" key.
Proceed this program [Y,N]?_

Figure 8-17 Command Window

5.) As indicated, press any key to continue. The process is completely automated and provides you with messages as to its status. R2.0.2 Software provides the message in Figure 8-85.

LoadSoftware
Ignore all pop-up message boxes during software install. They will be handled automatically. This window will disappear in a couple of minutes.
OK

Figure 8-18 R1.1.1 Software Message

At this point you just have to wait while the software loads (Approximately 10 minutes).

Near the end of the software install, the installation script will check to see if Direct CD needs to be updated. If Direct CD is updated, several more windows will appear. These windows will be handled automatically.

6.) When it completes loading the system will reboot.

If possible while the system is rebooting remove the CD from the drive. If the CD is remove the system will automatically reboot into the applications software.

If you didn't remove the CD, don't worry you will get a dialog box as in Figure 8-86.

8-10-5 Loading Applications Software (cont'd)

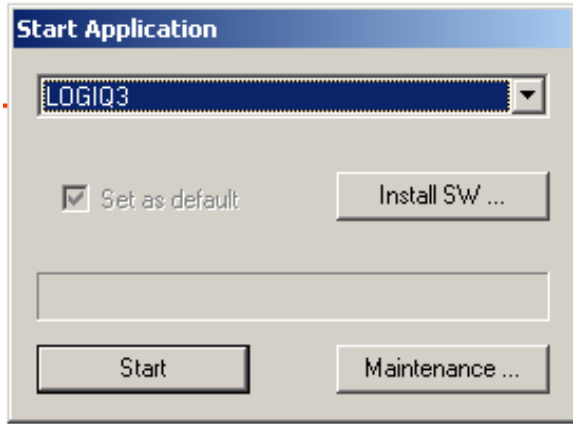


Figure 8-19 Start Software

7.) REMOVE the Applications CD
8.) From the Start Applications dialog box, select START.
9.) Select CANCEL.

NOTE: VERY IMPORTANT - Installation of R1.1.1 Application software upgrades the Direct CD software that controls the CDRW Drive to enable x24 Write operation. This software is not backwards compatible. Once R1.1.1, software has been installed you may not reinstall any earlier application software version without first reinstalling the Base Image Load Software. Failure to do this will reduce the reliability of the system.

8-2-6 Possible Behavior of the First Power Up After Application Load

After installing the new Application Software, if a new Front Panel code is needed:

The first time the Ultrasound application (echoloader) is run after the software upgrade, the application will detect that the Front Panel code is out of date. Because the Front Panel has to have power removed and re-applied before the Front Panel code update process can continue, the application boot up will automatically shut down the LOGIQ™ 3 just before the application boot up is complete.

In some cases, the system may not shutdown automatically. If the dialog box appears, "Ending Process, Please wait...", please wait 2 minutes. If the system does not turn off, force the shut down by holding down the on/off key until the monitor turns off then let it complete the power down process.

Simply ensure the system has powered down, and the power button is amber, then restart the system to load the Ultrasound application. The auto-power down will only occur on the first power up after the application upgrade.

8-2-7 System Setup

To complete the system setup:

1.) From the Touch Screen on the scanner, select *Utility>Connectivity>TCPIP Tab*.
2.) Ensure that DHCP is deselected so you can enter information manually.
3.) Input the DICOM information.
    * This should be the appropriate DICOM information for the system if it is on the hospital network. If it is not correct, input the correct data.
4.) After all information is entered select SAVE SETTINGS.
5.) If the system is **NOT** on a network you will need to input a set of "dummy" data for proper InSite and Diagnostic operation. Enter the following data if you are not on a network:
    * Computer Name:
    * IP Address: 3.192.28.253
    * Subnet Mask: 255.255.255.0
6.) After all information is entered select SAVE SETTINGS.
7.) Reset the VCR by going to *Utilities>System>Setup*.
8.) Select *Sony 9500 VCR* and SAVE
9.) Select *Exit* in the lower left-hand corner of the Touch Screen.
10.) Do an auto-shut down
11.) Press the **ON/OFF** switch on the Control Panel once to display the SYSTEM - EXIT menu.
12.) Select SHUTDOWN from the SYSTEM - EXIT menu.

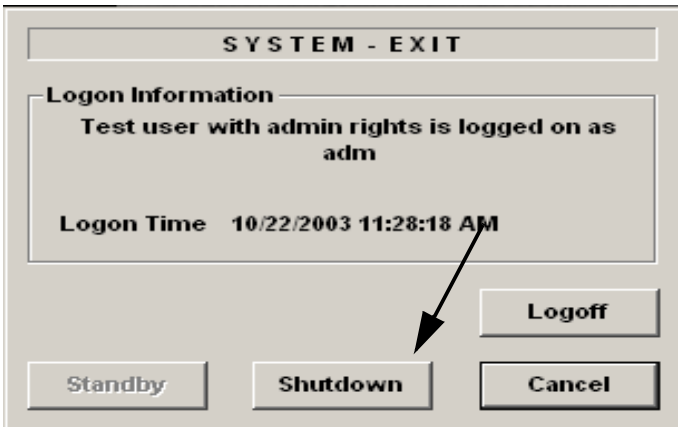


Figure 8-20 System Exit Menu for Back-end Processor Power Down

Section 8-3
Upgrading Application Software

8-3-1 Manpower

One person, .5 hour + travel

8-3-2 Tools

None

8-3-3 Preparations

Although loading applications software is not designed to write over presets, patient data and exams, it may be prudent to:

- Back up any customer preset configurations if necessary.
- Export and patient exam files if necessary.

Refer to 8-10-4 "Image Management Guide" on page 8-87 for deatils.

8-3-4 Applications Software Upgrade Procedure

WARNING ***While the software install procedure is designed to preserve data, you should save any patient data, images, system setups to a MOD or hardcopy.***

CAUTION **Remember to remove the MOD before continuing with the software install.**

1.) Place the “Application Software” CD-ROM into the CD-ROM drive.
2.) Power Down the scanner.
3.) Power up the scanner. Wait for a dialog box like the one in Figure 8-90.

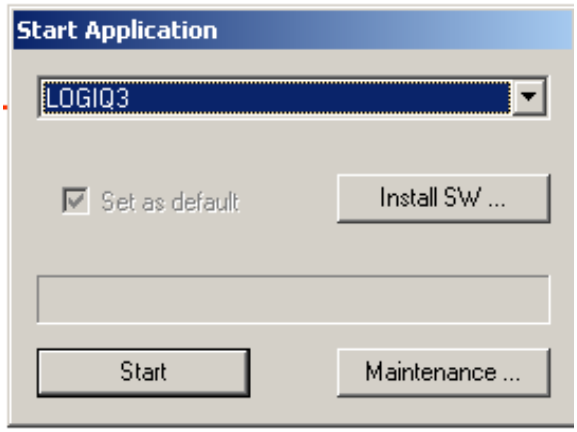


Figure 8-21 Start Application Window

8-11-4 Applications Software Upgrade Procedure (cont'd)

4.) Select INSTALL SW ... .

5.) There will be two dialog boxes popping up warning you that you are about to install new software as shown in Figure 8-91. In both cases click OK.

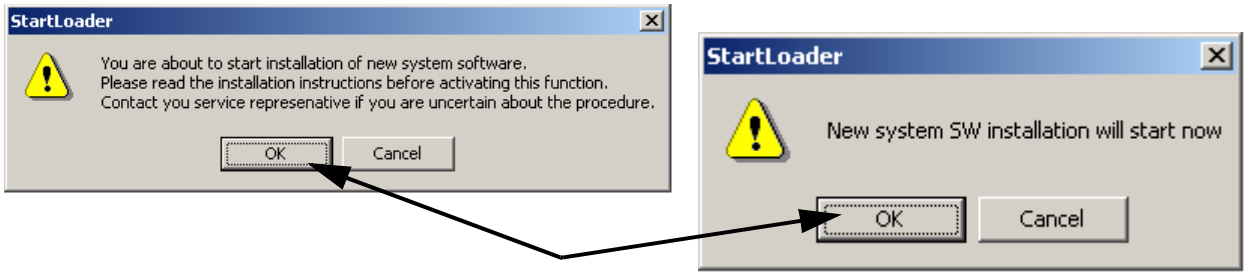

StartLoader
You are about to start installation of new system software.
Please read the installation instructions before activating this function.
Contact you service represenative if you are uncertain about the procedure.
OK
Cancel
StartLoader
New system SW installation will start now
OK
Cancel

Figure 8-22 StartLoader Dialog Boxes

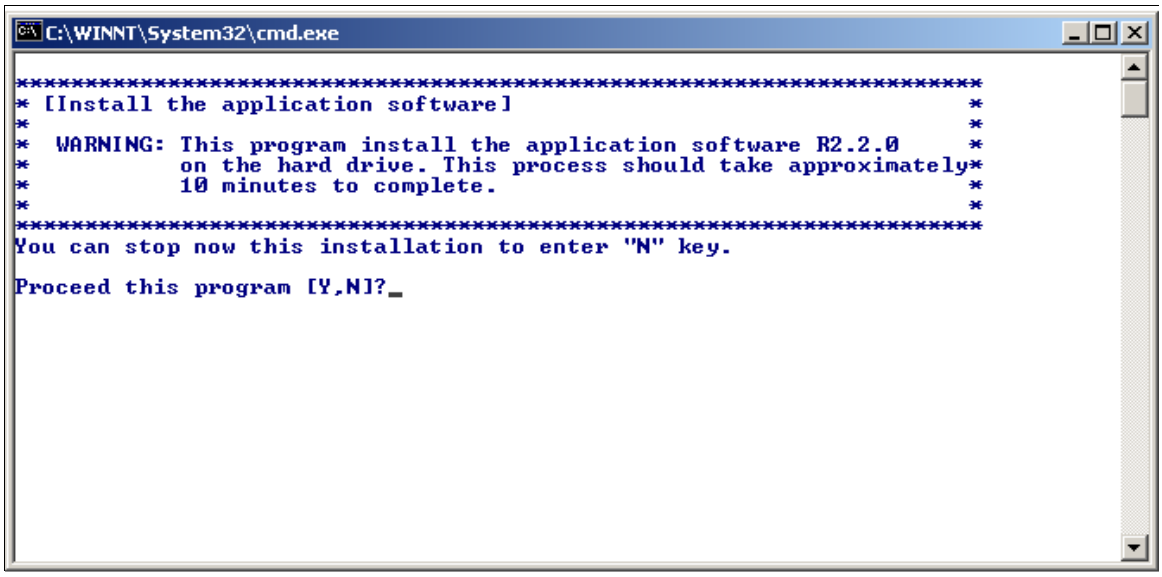

C:\WINNT\System32\cmd.exe
* [Install the application software] *
* WARNING: This program install the application software R2.2.0 *
on the hard drive. This process should take approximately*
10 minutes to complete. *
You can stop now this installation to enter "N" key.
Proceed this program [Y,N]?_

Figure 8-23 Command Window

6.) Another window will be displayed asking you to "Press any key to continue…".

8-11-4 Applications Software Upgrade Procedure (cont'd)

7.) As indicated, press any key to continue. The process is completely automated and provides you with messages as to its status. R1.1.1 Software provides the message in Figure 8-93.

LoadSoftware
Ignore all pop-up message boxes during software install. They will be handled automatically. This window will disappear in a couple of minutes.
OK

Figure 8-24 R1.1.1 Software Message

At this point you just have to wait while the software loads (Approximately 10 minutes).

Near the end of the R1.1.1 software install, the installation script will check to see if Direct CD needs to be updated. If Direct CD is updated, several more windows will appear. These windows will be handled automatically.

8.) WWhen it completes loading the system will reboot.

9.) Remove the CD from the drive

If possible, while the system is rebooting remove the CD from the drive. If you didn't do that don't worry you will get a dialog box like the one shown in Figure 8-94.

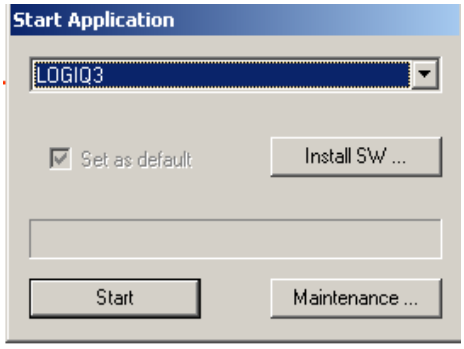


Figure 8-25 Start Software

10.)REMOVE the Applications CD

11.)From the Start Applications dialog box, select START.

12.)Select CANCEL.

8-3-5 Possible Behavior of the First Power Up After Application Load

After installing the new Application Software, if a new Front Panel code is needed:

The first time the Ultrasound application (echoloader) is run after the software upgrade, the application will detect that the Front Panel code is out of date. Because the Front Panel has to have power removed and re-applied before the Front Panel code update process can continue, the application boot up will automatically shut down the LOGIQ™ 3 just before the application boot up is complete.

In some cases, the system may not shutdown automatically. If the dialog box appears, "Ending Process, Please wait...", please wait 2 minutes. If the system does not turn off, force the shut down by holding down the on/off key until the monitor turns off then let it complete the power down process.

Simply ensure the system has powered down, and the power button is amber, then restart the system to load the Ultrasound application. The auto-power down will only occur on the first power up after the application upgrade.

8-3-6 System Setup

omplete the system setup:

1.) From the Touch Screen on the scanner, select *Utility>Connectivity>TCPIP Tab*.
2.) Ensure that DHCP is deselected so you can enter information manually.
3.) Input the DICOM information.
    * This should be the appropriate DICOM information for the system if it is on the hospital network. If it is not correct, input the correct data.
4.) After all information is entered select SAVE SETTINGS.
5.) If the system is **NOT** on a network you will need to input a set of "dummy" data for proper InSite and Diagnostic operation. Enter the following data if you are not on a network:
    * Computer Name:
    * IP Address: 3.192.28.253
    * Subnet Mask: 255.255.255.0
6.) After all information is entered select SAVE SETTINGS.
7.) Reset the VCR by going to *Utilities>System>Setup*.
8.) Select *Sony 9500 VCR* and SAVE
9.) Select *Exit* in the lower left-hand corner of the Touch Screen.
10.) Do an auto-shut down
11.) Press the **ON/OFF** switch on the Control Panel once to display the SYSTEM - EXIT menu.
12.) Select SHUTDOWN from the SYSTEM - EXIT menu.

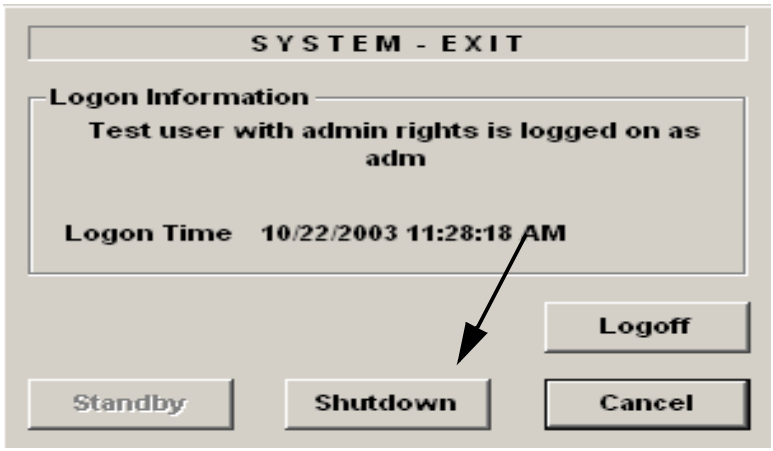


Figure 8-26 System Exit Menu for Back-end Processor Power Down

8-3-7 Restore Patient, Report, and User-Defined Presets

1.) Place the Backup/Restore media (MOD or CD-R) in the drive.
2.) Select the UTILITY tab on the Touch Panel. Select SYSTEM, then BACKUP/RESTORE.

Select everything under Restore by placing a check mark after Patient Archive, Report Archive, System Configuration, and User Defined Configuration. Then press RESTORE.

NOTE: If Caps Lock Active the display will be highlighted in the screen.

2.)

Chapter 9
Renewal Parts

Section 9-1
Overview

9-1-1 Purpose of Chapter 9

This chapter gives you an overview of Spare Parts available for the LOGIQ™ 3.

Table 9-1 Contents in Chapter 9

Section	Description	Page Number
9-1	Overview	9-1
9-2	List of Abbreviations	9-2
9-3	Operator Console Assy	9-3
9-4	MONITOR	9-5
9-5	Keyboard	9-6
9-6	External Covers	9-8
9-7	Mechanical Assembly's	9-10
9-8	I/O Interfaces	9-11
9-9	PCB Boards	9-12
9-10	BEP	9-14
9-11	Power Block	9-16
9-12	Power Cord	9-17
9-13	Probes	9-17
9-14	Peripherals	9-18
9-15	Cables Set	9-18
9-16	Option Parts	9-19

Section 9-2
List of Abbreviations

- Assy - Assembly
- BEP - Back End Processor
- Ctrl - Control
- FEP - Front End Processor
- F.O.B - Flock of Birds or 3-D Option
- FRU 1 - Replacement part available in parts hub
- FRU 2 - Replacement part available from the manufacturer (lead time involved)
- Int -Internal
- I/O - Input/Output
- PWA - Printed Wire Assembly
- Recv - Receive
- XFRMR - Transformer

Section 9-3

Operator Console Assy

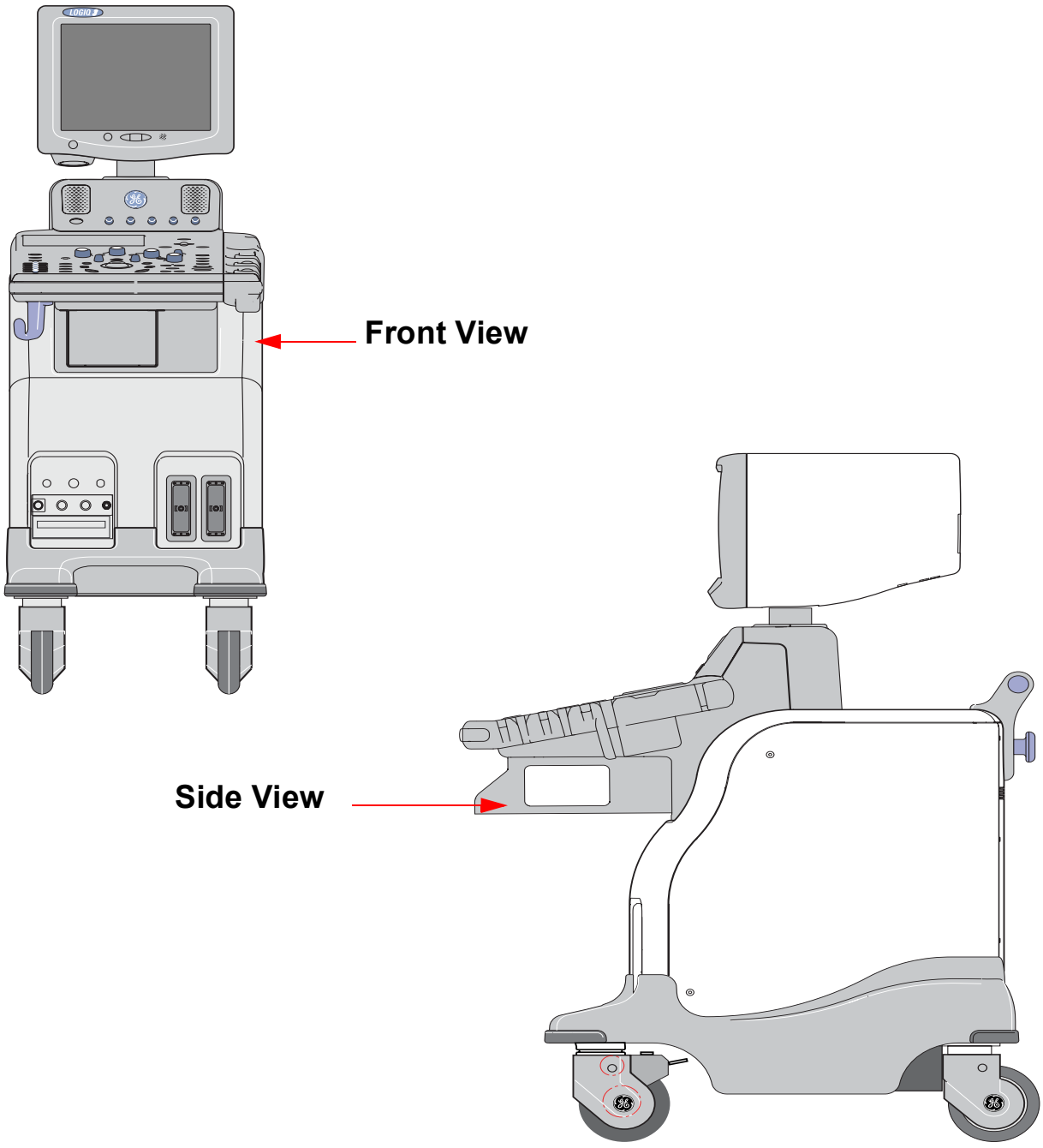


Figure 9-1 Operator Console Assembly

Section 9-3 Operator Console Assy (cont'd)

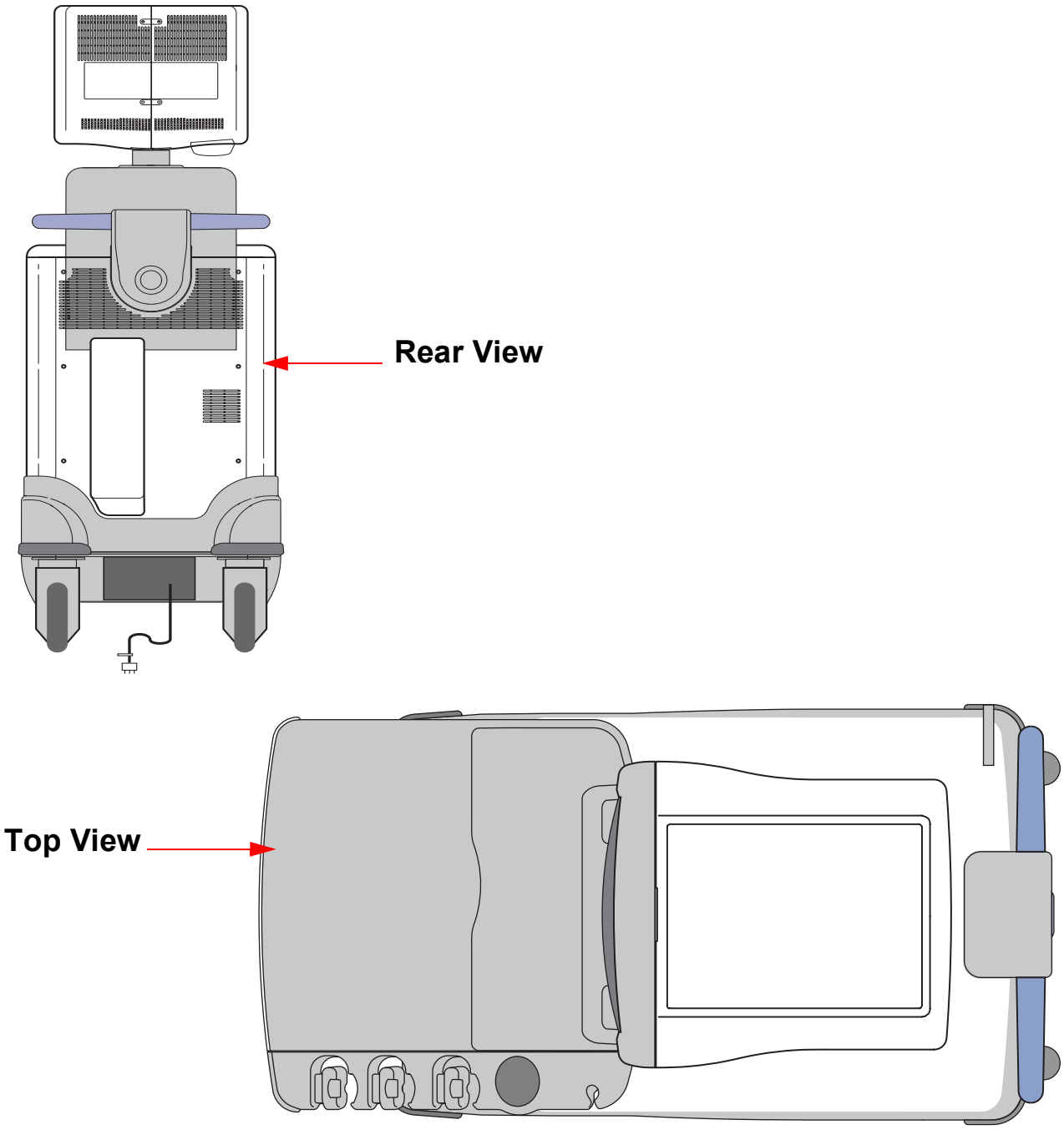


Figure 9-2 Operator Console Assembly

Section 9-4
MONITOR

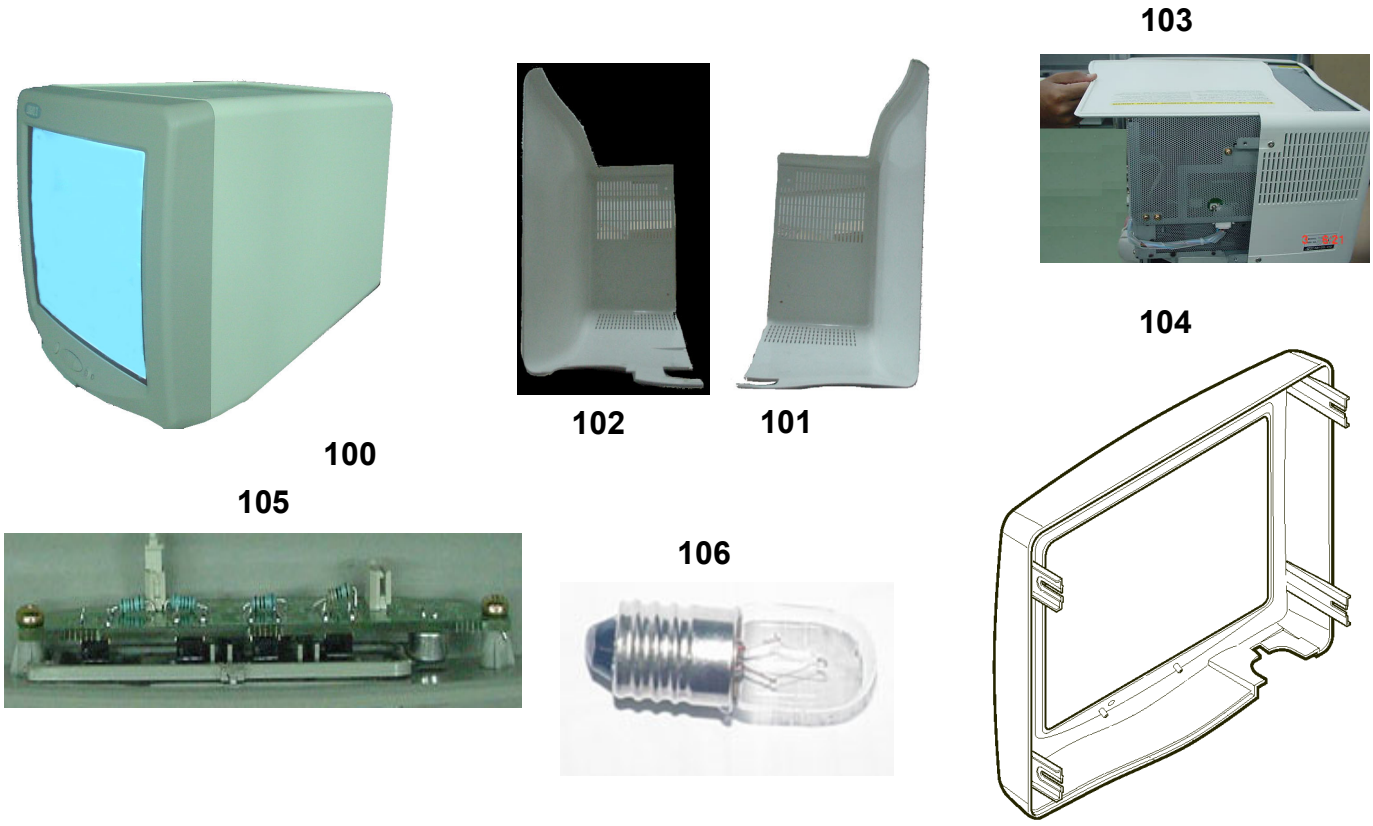


Figure 9-3 Monitor FRU's

Table 9-2 Monitor FRU's

Item	Part Name	Part Number	Comments	Qty	FRU
100	Monitor Assembly	2319551-3		1	1
101	Monitor Cover Left	2320764		1	1
102	Monitor Cover Right	2320766		1	1
103	Monitor Cover Top	2320762		1	1
104	Monitor Cover Front	2320768	Bezel Assy	1	1
105	Monitor Switch Assembly	2300008	Common part with L5	1	1
106	Task Lamp	2317347	Common part with L5		

Section 9-5
Keyboard

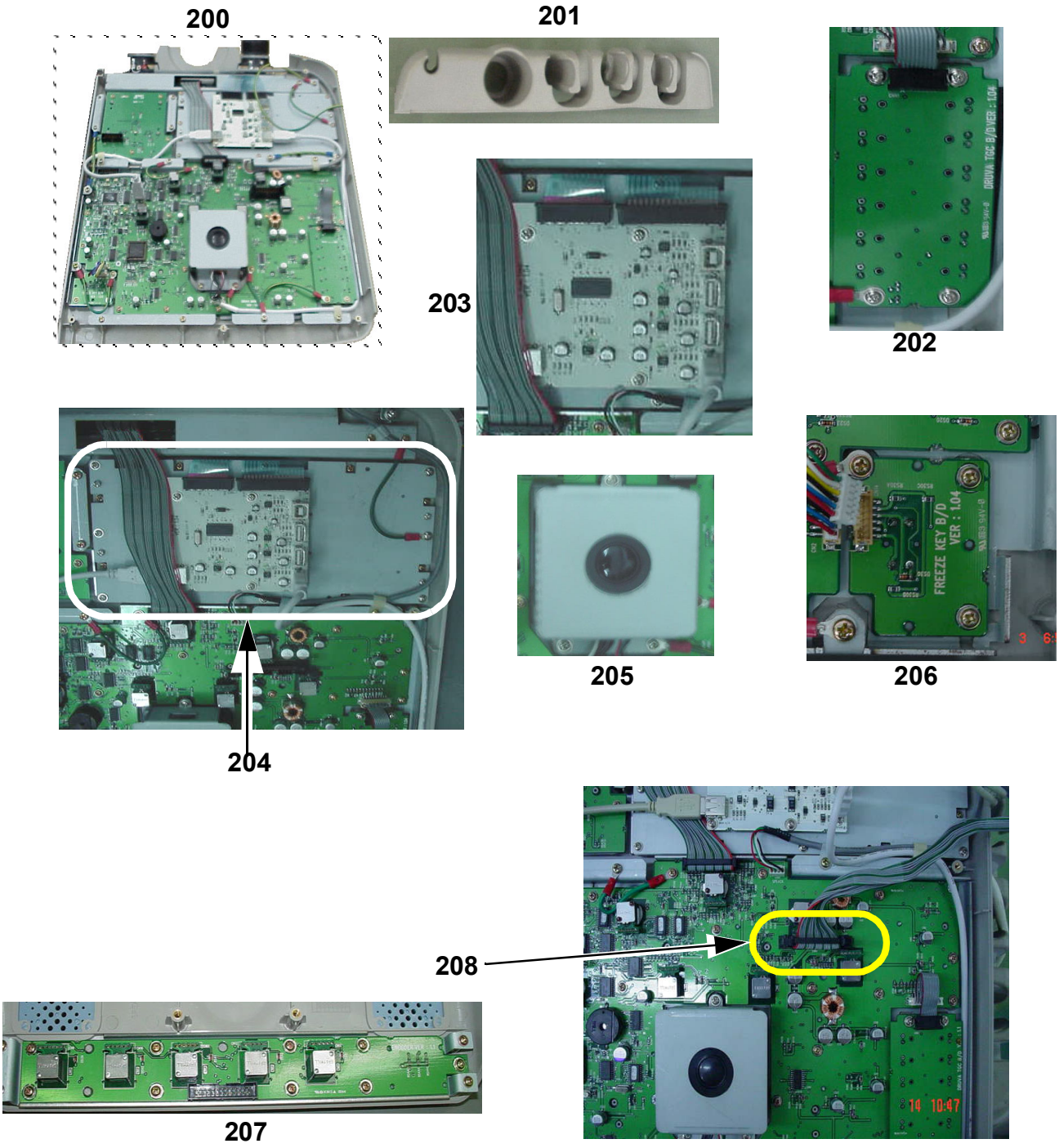


Figure 9-4 Keyboard FRU's

Table 9-3 Keyboard FRU's

Item	Part Name	Part Number	Comments	Qty	FRU
200	Keyboard Assembly	2319549-2	English Keyboard Assy	1	1
201	Probe Holder	2319638		1	1
202	Keyboard TGC Assy	2320741		1	1
203	Hub PCB Assy	2350376		1	1
204	A/N Keyboard Assy	2320751		1	1
205	Trackball Assy	2317344	Common part with L5	1	1
206	Freeze Key Assy	2320742		1	1
207	Power Switch & Encoder PCB Assy	2364732		1	1
208	Keyboard Power Cable	2364742		1	1

Section 9-6
External Covers

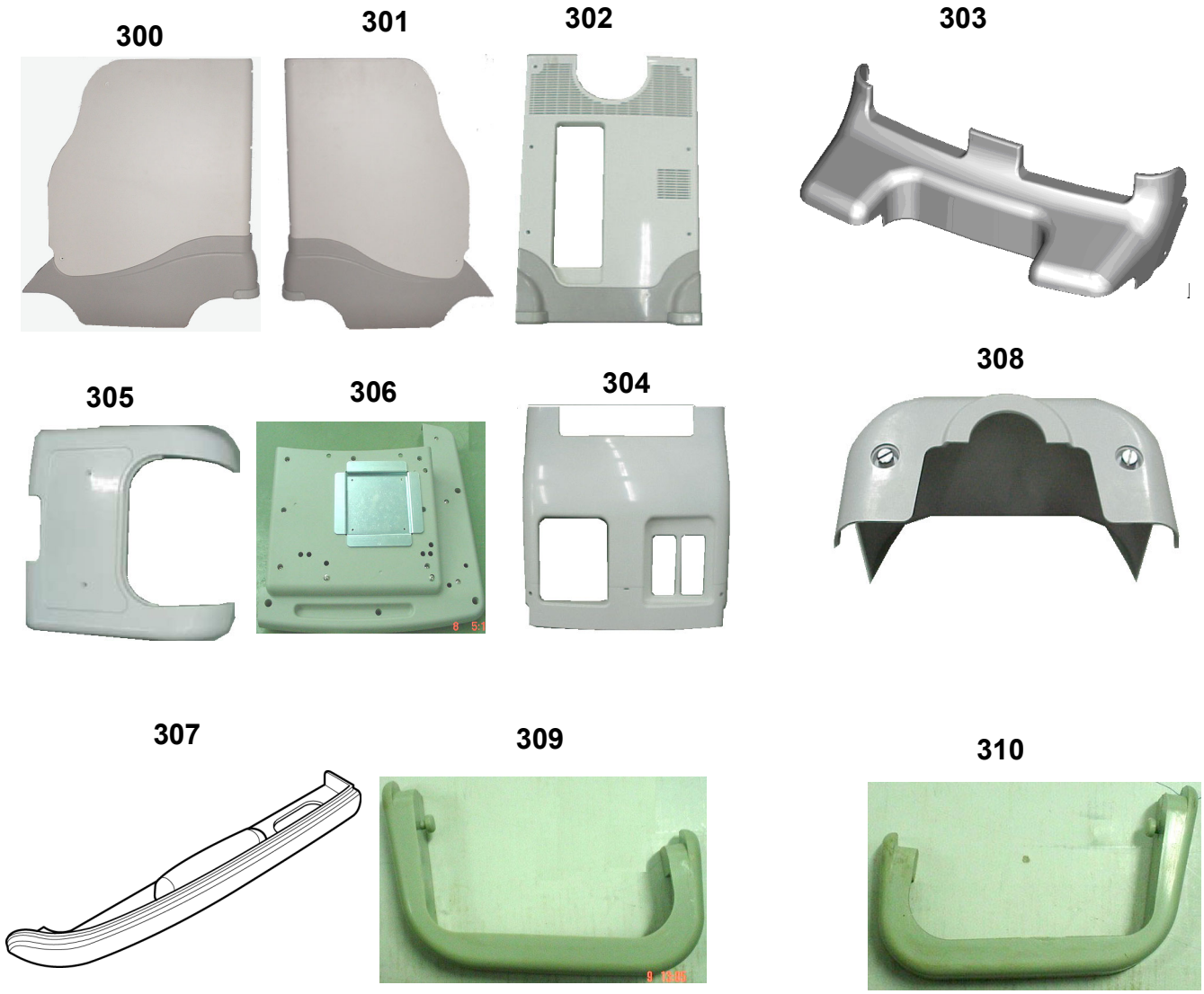


Figure 9-5 External Covers FRU's

Table 9-4 External Covers FRU's

Item	Part Name	Part Number	Comments	Qty	FRU
300	Right Cover Assy	2323369	Right Cover + Bumper	1	1
301	Left Cover Assy	2323368	Left Cover + Bumper	1	1
302	Rear Cover Assy	2367629	Rear Cover + Bumper for Asia	1	1
		2367630	Rear Cover + Bumper for rest of world		
303	Front Bumper Assy	2319621		1	1
304	Front Cover Assy	2367628		1	1
305	Top Cover Assy	2362285		1	1
306	Keyboard Bottom Cover	2319628		1	1
307	Keyboard Bumper	2319637		1	1
308	Keyboard Rear Cover Assy	2334618	Back Cover	1	1
309	Front Rubber Bumper Left	2319631		1	1
310	Front Rubber Bumper Right	2319632		1	1

Section 9-7
Mechanical Assembly's

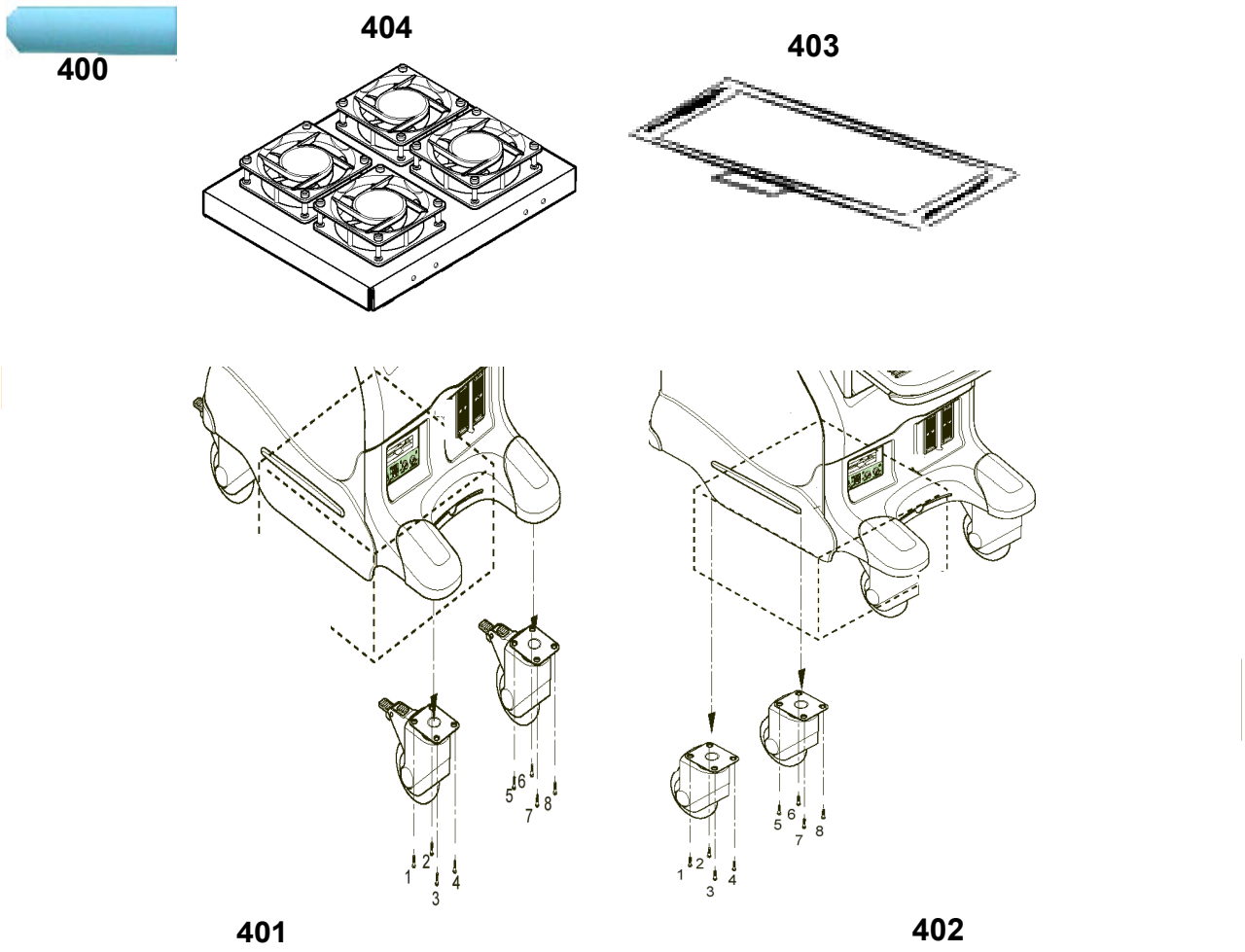


Figure 9-6 Mechanical Assembly FRU's

Table 9-5 Mechanical Assembly FRU's

Item	Part Name	Part Number	Comments	Qty	FRU
400	Handle Rod	2334639		1	1
401	Front Castor	2300021	Common with L5	2	1
402	Rear Castor	2300022	Common with L5	2	1
403	Air Filter	2326158		1	1
404	Card Cage Fan Assy	2350375	DC Fan Assembly	1	1
405	Speaker Set	2319526		1	1

Section 9-8
I/O Interfaces

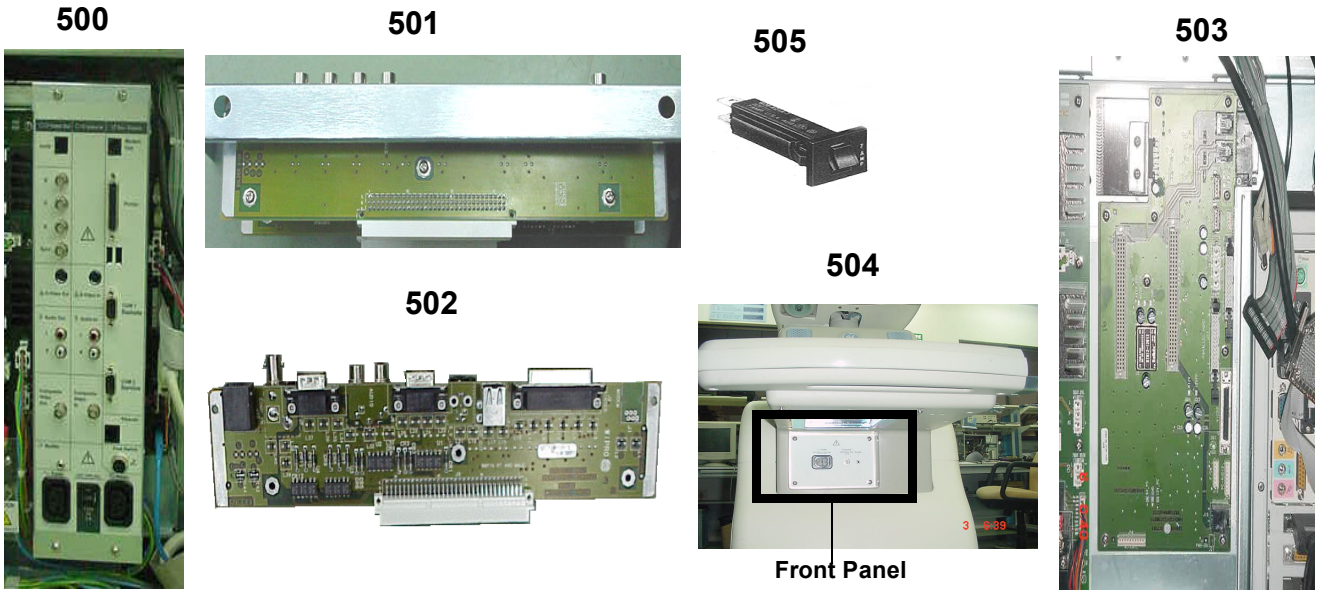


Figure 9-7 I/O Interfaces FRU's

Table 9-6 I/O Interfaces FRU's

Item	Part Name	Part Number	Comments	Qty	FRU
500	Rear Panel Assembly	2319547	Rear Panel Assy - 230VAC	1	1
		2383299	Rear Panel Assy - 100/115VAC	1	1
501	RP1 Assembly	2319486		1	1
502	RP2 Assembly	2319488		1	1
503	Rear Panel Interface Assembly	2319484-2	RPI	1	1
504	Front Panel Assembly	2383298	Front Panel Assy - 115VAC	1	1
505	Rear Panel Fuse - 3A	2332968	3A Fuse		
505	Rear Panel Fuse - 5A	2316948	5A Fuse	1	1

Section 9-9
PCB Boards

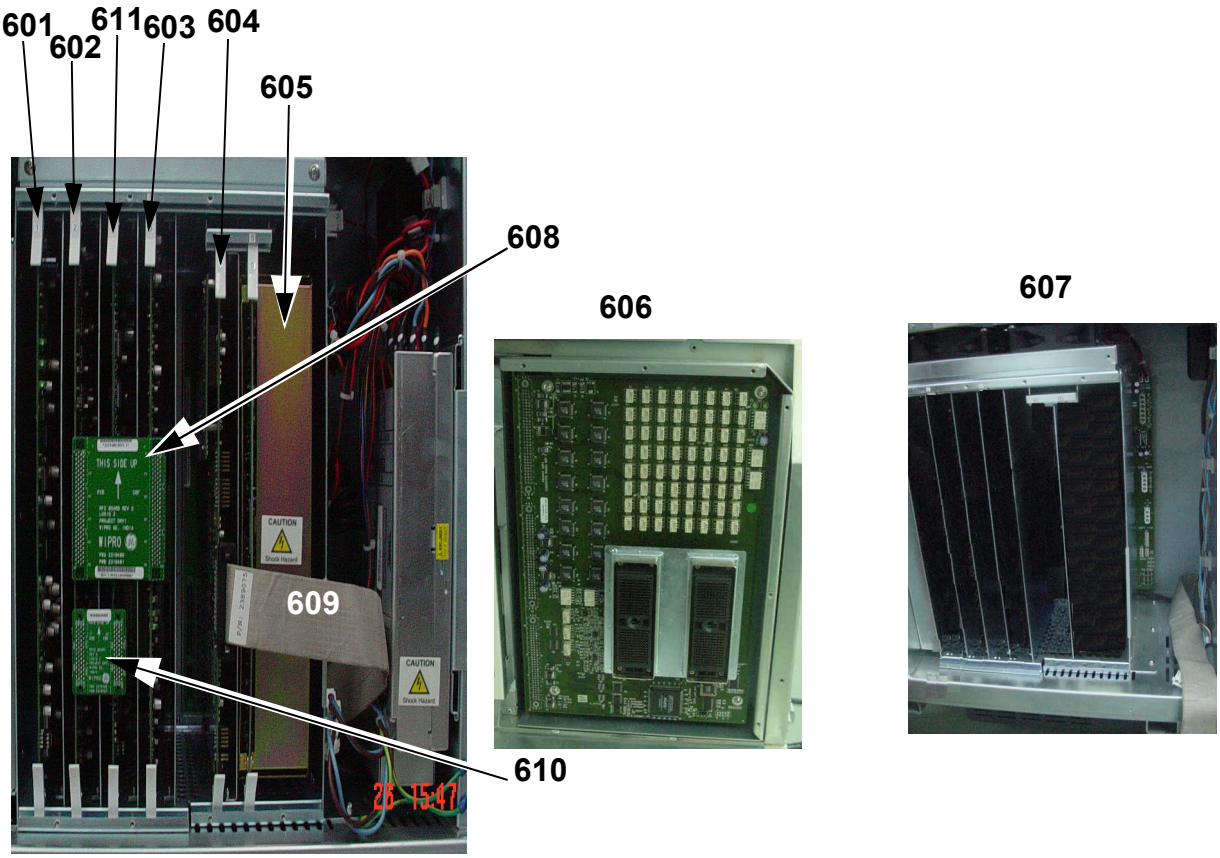


Figure 9-8 PCB Boards FRU'S

Table 9-7 PCB Boards FRU's

Item	Part Name	Part Number	Comments	Qty	FRU
601	Transmit Board Assy	2318124-2	TXB	1	1
602	Receive Board	2318122-2	RXB	1	1
603	Digital Beam Former Board	2318126	DBF	1	1
604	Front End Control Board	2277093-8		1	1
605	High Voltage Power Supply	2277105	HVPS	1	1
606	Connector Board	2318128-2	Conn. Board	1	1
607	Card cage with Backplane	2328381-3	Cardcage + Backplane Board	1	1
608	RFC Assy	2319480	RFC	1	1
609	PCI Cable	2363523	Common Part with L5	1	1
610	RFC2 Assy	2379706		1	1

Table 9-7 PCB Boards FRU's

Item	Part Name	Part Number	Comments	Qty	FRU
611	CWD Assy	2401834		1	1
612	CWD+BPB+Cardcage Assy	2405514	This is a combination of FRU 607 and 611		

Section 9-10
BEP

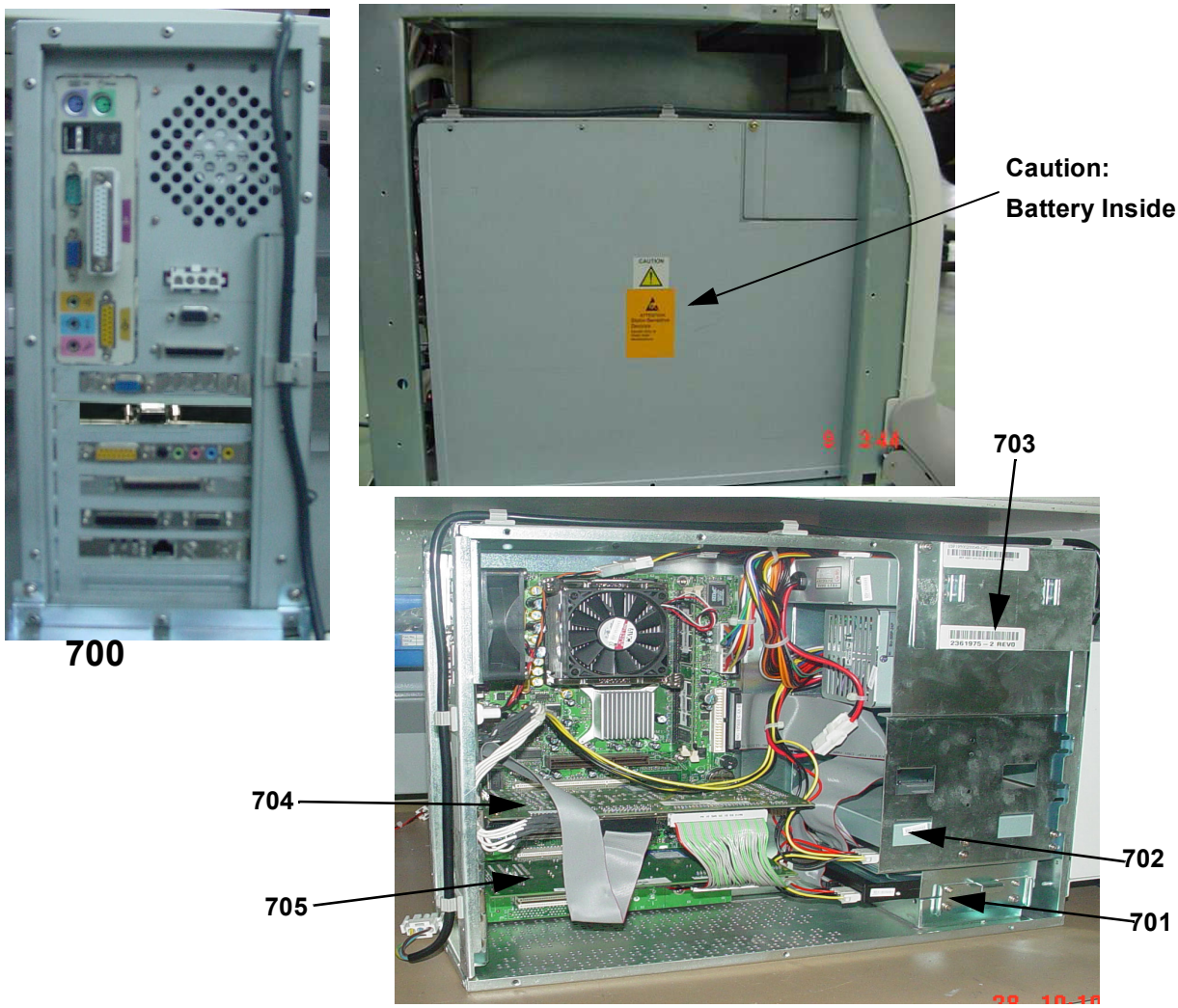


Figure 9-9 PC Block FRU's

Table 9-8 PC Block FRU's

Item	Part Name	Part Number	Description	Qty	FRU
700	BEP Assy	2361975-4	Back End Processor Assy	1	1
701	HDD	2361957		1	1
702	CDRW For BEP 2 - 48x24x48	2381159		1	1
703	Nipron Power Supply	2399007		1	1
704	PCVIC PCB	2393280		1	1

Table 9-8 PC Block FRU's

Item	Part Name	Part Number	Description	Qty	FRU
705	PC2IP PCB	FB200973		1	1
706	Base+Applocation Load Software for BEP-1 (2361975)	2385824-4		1	1
707	Base+Applocation Load Software for BEP-2 (2361975-2)	2385826-4		1	1

CAUTION **BEP contains battery above the ATX Power supply. Handle With care during Service & Replacements.**

Disposal of Battery should follow local Environment Guidelines.

Section 9-11
Power Block

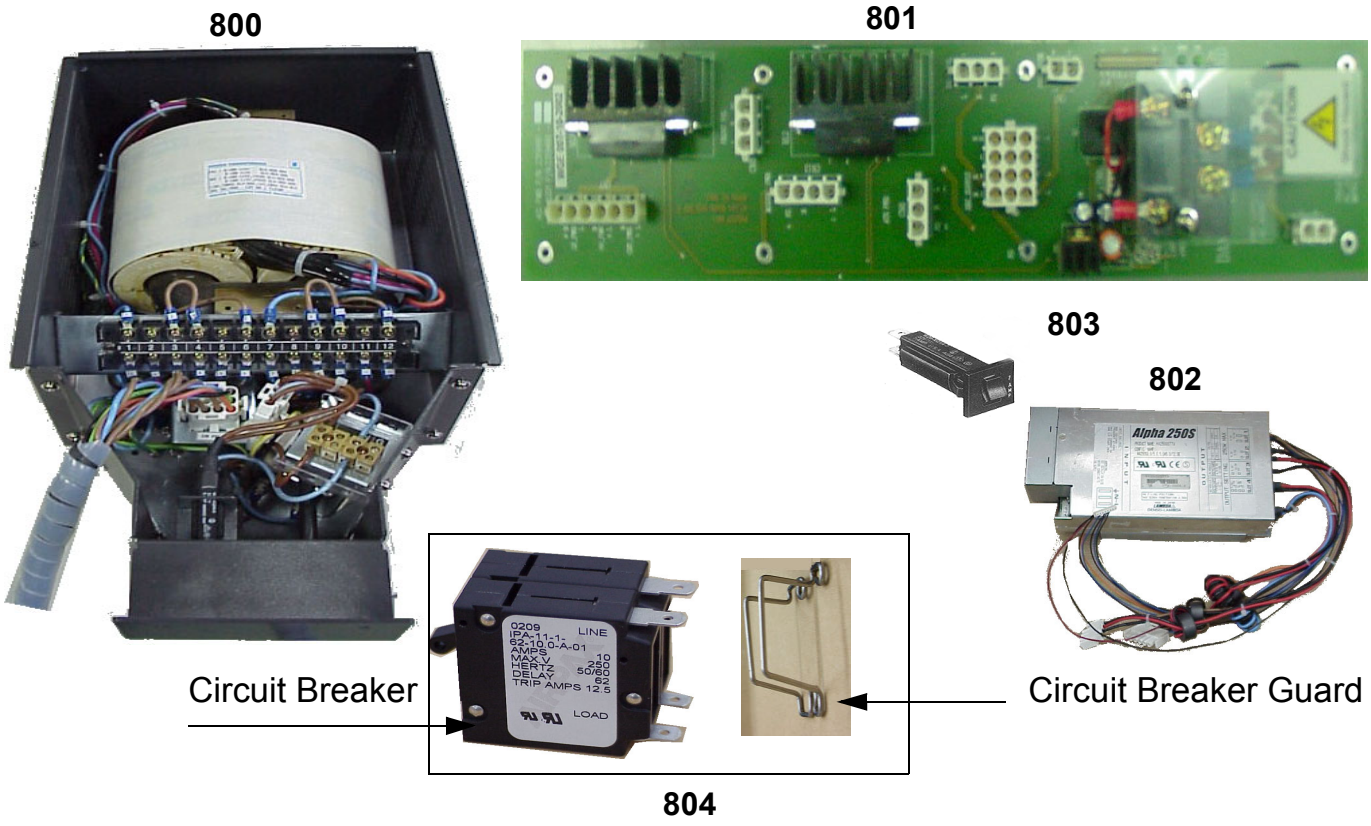


Figure 9-10 Power Block FRU's

Table 9-9 Power Block FRU's

Item	Part Name	Part Number	Description	Qty	FRU
800	Transformer Assy	2406958	Transformer Assy	1	1
801	LVPS	2319545	Low Voltage Power Supply	1	1
802	ACI Assembly	2319490-2	AC Interface Board	1	1
803	Transformer Fuse	2361948		1	1
804	Circuit Breake and Guardr	2405517		1	1
805	Noise Filter	2319501		1	1

.

NOTICE **Replace Circuit Breaker and Noise Filter in case of transformer failure**
Refer Disassy procedure of Circuit Breaker and noise filter.

Section 9-12
Power Cord

Table 9-10 Power Cord

Item	Part Name	Part Number	Description	Qty	FRU
900	Power Cord Assy	2365878	Power Cord - Japan	1	1
901	Power Cord Assy	2343034	Power Cord - India	1	1
902	Power Cord Assy	2342033	Power Cord - Europe	1	1
903	Power Cord Assy	2334499	Power Cord - USA	1	1

Section 9-13
Probes

Table 9-11 Probes

Item	Part Name	Part Number	Description	Qty	FRU
1000	3C	2286354	Convex Probe	1	2
1001	5C	2294516	Convex Probe	1	2
1002	E8C	2294641	Micro Convex Probe	1	2
1003	10LB	2253846	Linear Probe	1	2
1004	3S	2323337	Sector Probe	1	2
1005	3.5C	2296158	Convex Probe	1	2
1006	7S	2263669	Sector Probe	1	2

Section 9-14
Peripherals

Table 9-12 Peripherals

Item	Part Name	Part Number	Description	Qty	FRU
1100	SVO-9500MD	Local	Sony VCR	1	2
1101	SVO-9500MDP	Local	Sony VCR	1	2
1102	AG-MD835P	Local	Panasonic VCR	1	2
1103	AG-MD835E	Local	Panasonic VCR	1	2
1104	UP-895MDW	Local	Sony B/W Printer	1	2
1105	UP- UPD895 USB	Local	Sony B/W Printer	1	2
1106	Model P91W	Local	Mitsubishi B&W Printer	1	2
1107	UP-21MD	Local	Sony Color Printer	1	2
1108	UP-21MD USB	Local	Sony Color Printer	1	2
1109	UP-23MD USB	Local	Sony Color Printer	1	1
1110	CP-900UM	Local	Mitsubishi Color Printer	1	2
1111	UP-51MD	Local	Sony Color Printer	1	2
1112	HP 990CXi	Local	HP PC Printer	1	2
1113	HP 6122	Local	HP PC Printer		
1114	HP 5652	Local	HP PC Printer		
1115	CP-900E	Local	Mitsubishi Color Printer	1	2
1116	CP-CP-900DW	Local	Mitsubishi Color Printer	1	2

Section 9-15
Cables Set

Table 9-13 Cables Set - 2367627

Item	Part Name	Part Number	Description	Qty	FRU
1200	Cable Set	2367627		1	1

Section 9-16
Option Parts

Table 9-14 Option Parts

Item	Part Name	Part Number	Description	Qty	FRU
1300	ECG Cable Hook	2283028		1	1
1301	ECG Cable Assembly 37	2319535		1	1
1302	Cable Set for B/W Printer	2369943		1	1
1303	Cable Set for B/W Digital Printer	2367622		1	1
1304	Cable Set for Analog Color Printer	2369944		1	1
1305	Cable Set for Digital Color Printer	2367621		1	1
1306	Cable Set for Sony VCR	2367618		1	1
1307	Cable Set for Panasonic VCR	2367620		1	1
1308	VGP Tray for Logiq 3	2334260		1	1
1309	VGP Tray Cover for Logiq 3	2352823		1	1
1310	Color Printer Mounting Plate - A	2377612		1	1
1311	Color Printer Mounting Plate - B	2377613		1	1
1312	VCR Mounting Tray for Logiq 3	2380864		1	1
1313	VCR Mounting Tray Bracket for Logiq 3	2380866		1	1
1314	Global Modem Kit	2245794		1	1
1315	ECG Patient I/O Module	FA200801		1	1
1316	THI Board	2288838-2		1	1
1317	Additional Probe port Adapter	2334993		1	1
1318	Foot Switch for Logiq 3	FB200952		1	1
1319	MOD Top Mounting Plate	2380861		1	1
1320	MOD Bottom Mounting Plate	2380862		1	1
1321	MOD for Logiq 3	2384284		1	1
1322	MOD Power Supply	2384285		1	1
1323	Russian Language Kit	2331768		1	1
1324	Greek Langyage Kit	2331769		1	1
1325	PGC Microphone for Logiq 3	2326844		1	1
1326	Cable ECG Marquette IEC	164L0026		1	1
1327	Leadwires ECG Marquette IEC	164L0028		1	1

Chapter 10
Care & Maintenance

Section 10-1
Overview

10-1-1 Periodic Maintenance Inspection

It has been determined by engineering that your LOGIQ™ 9 system does not have any high wear components that fail with use, therefore no Periodic Maintenance Inspections are mandatory. Some Customers Quality Assurance Programs may require additional tasks and or inspections at a different frequency than listed in this manual.

10-1-2 Purpose of Chapter 10

This chapter describes **Care & Maintenance** (PM) on the scanner and its peripherals. These PM procedures are intended to maintain the quality of the ultrasound systems performance. Read this chapter completely and familiarize yourself with the procedures before starting a PM.

CONTENTS IN CHAPTER 10

Table 10-1 Contents in Chapter 10

Section	Description	Page Number
10-1	Overview	10-1
10-2	Why do Maintenance	10-2
10-3	Periodic Maintenance Schedule	10-2
10-4	Tools Required	10-4
10-5	System Maintenance	10-7
10-6	Using a Phantom	10-12
10-7	Electrical Safety Tests	10-12
10-8	When There's Too Much Leakage Current...	10-28
	PM Inspection Certificate	10-29

CAUTION **Practice good ESD prevention. Wear an anti–static strap when handling electronic parts and even when disconnecting/connecting cables.**

DANGER **THERE ARE SEVERAL PLACES ON THE BACKPLANE, THE AC DISTRIBUTION, AND DC DISTRIBUTION THAT ARE DANGEROUS. BE SURE TO DISCONNECT THE SYSTEM POWER PLUG AND OPEN THE MAIN CIRCUIT BREAKER BEFORE YOU REMOVE ANY PARTS. BE CAUTIOUS WHENEVER POWER IS STILL ON AND COVERS ARE REMOVED.**

CAUTION **Do not pull out or insert circuit boards while power is ON.**

Section 10-2
Why do Maintenance

10-2-1 Keeping Records

It is good business practice that ultrasound facilities maintain records of quality checks and corrective maintenance. The Ultrasound Inspection Certificate(Provided on Page 10-29) provides the customer with documentation that the ultrasound scanner is maintained on a periodic basis.

A copy of the Ultrasound Periodic Maintenance Inspection Certificate should be kept in the same room or near the scanner.

10-2-2 Quality Assurance

In order to gain accreditation from organizations such as the American College of Radiology (USA), it is the customer's responsibility to have a quality assurance program in place for each scanner. The program must be directed by a medical physicists, the supervising radiologist/physician or appropriate designee.

Routine quality control testing must occur regularly. The same tests are performed during each period so that changes can be monitored over time and effective corrective action can be taken.

Testing results, corrective action and the effects of corrective action must be documented and maintained on the site.

Your GE service representative can help you with establishing, performing and maintaining records for a quality assurance program. Please contact us for coverage information and/or price for service.

Section 10-3
Periodic Maintenance Schedule

10-3-1 How often should care & maintenance tasks be performed?

The Care & Maintenance Task Schedule (provided on page 10-3) specifies how often your LOGIQ™ 9 should be serviced and outlines items requiring special attention.

NOTE: It is the customer's responsibility to ensure the LOGIQ™ 3 care & maintenance is performed as scheduled in order to retain its high level of safety, dependability and performance.

Your GE Service Representative has an indepth knowledge of your LOGIQ™ 3 ultrasound scanning system and can best provide competent, efficient service. Please contact us for coverage information and/or price for service.

The service procedures and recommended intervals shown in the Care and Maintenance Task schedule assumes that you use your LOGIQ™ 3 for an average patient load (10-12 per day) and not used as a primary "mobile unit" which is transported between diagnostic facilities.

If conditions exist which exceed typical usage and patient load, then it is recommended to increase the periodic maintenance frequencies

NOTE: If conditions exist which exceed typical usage and patient load, then it is recommended to increase the maintenance frequencies.

Table 10-2 Customer Care Schedule

Service at Indicated Time	Daily	Weekly	Monthly	Annually	Notes
Clean Probes	•*				* or before each use
Clean Probe Holders	•				
Clean Air Filter		•			more frequently depending on your environment
Inspect AC Mains Cable			•		Mobile Unit Check Weekly
Inspect Cables and Connectors			•		
Clean Console			•		
Clean Monitor			•		
Inspect Wheels, Casters, brakes and Swivel Locks			•		Mobile Unit Check Daily
Console Leakage Current Checks				•	also after corrective maintenance
Peripheral Leakage Current Checks				•	also after corrective maintenance
Surface Probe Leakage Current Checks				•	also after corrective maintenance
Endocavity Probe Leakage Current Checks					**Twice Annually**
Transesphongeal Probe Leakage Current Checks					**As Prescribed in probe manual**
Surgical Probe Leakage Current Checks					**As Prescribed in probe manual**
Measurement Accuracy Checks				•	also after corrective maintenance
Probe/Phantom Checks				•	also after corrective maintenance

Section 10-4
Tools Required

10-4-1 Special Tools, Supplies and Equipment

10-4-1-1 Specific Requirements for Care & Maintenance

Table 10-3 Overview of Requirements for Periodic Maintenance

Tool	Part Number	Comments
Digital Volt Meter (DVM)		
Anti Static Kit	46–194427P231 46–194427P279 46–194427P369 46–194427P373 46–194427P370	Kit includes anti–static mat, wrist strap and cables for 200 to 240 V system 3M #2204 Large adjustable wrist strap 3M #2214 Small adjustable wrist strap 3M #3051 conductive ground cord
Anti Static Vacuum Cleaner	46–194427P278 46–194427P279	120V 230V
Air Filter		air intake
Safety Analyzer	46–285652G1	DALE 600 KIT (or equivalent) for electrical tests
SVHS VCR Cassette	E7010GG E7010GF	60 minute 120 minute
SVHS VCR Head Cleaner		See VCR user manual for requirements
QIQ Phantom	E8370RB	RMI Grayscale Target Model 403GS
B/W Printer Cleaning Sheet		See printer user manual for requirements
Color Printer Cleaning Sheet		See printer user manual for requirements
Disposable Gloves		

Section 10-5
System Maintenance

10-5-1 Preliminary Checks

The preliminary checks take about 15 minutes to perform. Refer to the system user documentation whenever necessary.

Table 10-4 System Checks

Step	Item	Description
1	Ask & Listen	Ask the customer if they have any problems or questions about the equipment.
2	Paperwork	Fill in the top of the Ultrasound Inspection Certificate(see page 10-29). Note all probes and system options.
3	Power up	Turn the system power on and verify that all fans and peripherals turn on. Watch the displays during power up to verify that no warning or error messages are displayed.
4	Probes	Verify that the system properly recognizes all probes.
5	Displays	Verify proper display on the monitor
6	Presets	Backup all customer presets on an CD-R.

10-5-2 Functional Checks (See Also Chapter 4)

The functional checks take about 60 minutes to perform. Refer to the system user documentation whenever necessary.

10-5-2-1 System Checks

Table 10-5 System Functional Checks

÷	Step	Description
	B-Mode	Verify basic B-Mode (2D) operation. Check the basic system controls that affect this mode of operation.
	CF-Mode	Verify basic CF-Mode (Color Flow Mode) operation. Check the basic system controls that affect this mode of operation.
	Doppler Modes	Verify basic Doppler operation (PW). Check the basic system controls that affect this mode of operation.
	M-Mode	Verify basic M-Mode operation. Check the basic system controls that affect this mode of operation.
	*Applicable Software Options	Verify the basic operation of all optional modes such as Multi-Image, 3D (Option), Harmonics (Option), Cine, etc. Check the basic system controls that affect each options operation.
	Probe Elements	Perform an Element Test, on each probe to verify that all probe elements (and system channels) are functional.
	System Diagnostic	Perform the Automatic Tests, to verify that all boards function according to specifications.
	Control Panel Test	Perform the Control Panel Test Procedure, to verify that all keyboard controls are OK. This is performed by the internal PC (backend processor) which does a normal keyboard run through.
	Monitor	Verify basic Monitor display functions. Refer to Chapter 3 of the User Manual.
	Measurements	Scan a gray scale phantom and use the measurement controls to verify distance and area calculation accuracy. Refer to the User Manual, Chapter 18, for measurement accuracy specifications.

*NOTE: * Some software may be considered standard depending upon system model configuration.*

10-5-2-2 Peripheral/Option Checks

If any peripherals or options are not part of the system configuration, the check can be omitted. Refer to the User Manual for a list of approved peripherals/options.

Table 10-6 GE Approved Peripheral/Hardware Option Functional Checks

Step	Item	Description
1	VCR	Verify record/playback capabilities of the VCR. Clean heads and covers if necessary.
2	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
5	InSite/iLinq	Verify that InSite is functioning properly. Ensure two-way remote communications. (Warranty & Contract Customers only)
6	Camera	Verify hardcopy output of the film camera. Clean as necessary.
7	Footswitch	Verify that the footswitch is functioning as programed. Clean as necessary.
8	ECG	Verify basic operation with customer

10-5-3 Input Power

10-5-3-1 Mains Cable Inspection

Table 10-7 Mains Cable Inspection

Step	Item	Description
1	Unplug Cord	Disconnect the mains cable from the wall and system.
2	Inspect	Inspect it and its connectors for damage of any kind.
3	Verify	Verify that the LINE, NEUTRAL and GROUND wires are properly attached to the terminals, and that no strands may cause a short circuit.
4	Verify	Inlet connector retainer is functional.

10-5-4 Cleaning

General Cleaning

Table 10-8 General Cleaning

Step	Item	Description
1	Console	Use a fluid detergent in warm water on a soft, damp cloth to carefully wipe the entire system. Be careful not to get the cloth too wet so that moisture does not enter the console.
2	Probe Holder	Clean probe holders (they may need to be soaked to remove excess gel).
3	Monitor	For monitor, use a non-ammonia (just isopropyl and water) lens cleaner. These are available at most computer outlet stores. DO NOT use Windex, Screen-Clean, etc., because these contain ammonia, which will remove the anti-glare coating on the monitor.

10-5-4-1 Air Filter Cleaning

\

Table 10-9 Air Filter Cleaning - frequency varies with your environment

Step	Item	Description
1	Remove Filter Cover	Refer to Chapter 8 for air filter location and removal instructions.
2	Clean Filter	The filters can be cleaned in sprinkling water, or they can be dusted with a vacuum cleaner. If the filter is metal wash and/or vacuum. If the filter is fiber or plastic vacuum or replace.
3	Install Filter	Install the clean filter.

NOTE: For your convenience or of the air filter is too dirty, replacement filters are available. Refer to Chapter 9 for the air filter replacement part number.

10-5-5 Physical Inspection

Table 10-10 Physical Checks

Step	Item	Description
1	Labeling	Verify that all system labeling is present and in readable condition.
2	Scratches & Dents	Inspect the console for dents, scratches or cracks.
3	Control Panel	Inspect keyboard and control panel. Note any damaged or missing items.
4	Control Panel Movement	Verify ease of control panel (Operator I/O Panel) movement in all acceptable directions. Ensure that it latches in position as required.
5	Wheels & Brakes	Check all wheels and casters for wear and verify operation of foot brake, to stop the unit from moving, and release mechanism. Check all wheel locks and wheel swivel locks for proper operation.
6	Cables & Connectors	Check all internal cable harnesses and connectors for wear and secure connector seating. Pay special attention to footswitch assembly and probe strain or bend reliefs.
7	Shielding & Covers	Check to ensure that all EMI shielding, internal covers, air flow panels and screws are in place. Missing covers and hardware could cause EMI/RFI problems while scanning.
8	External I/O	Check all connectors for damage and verify that the labeling is good.
9	Op Panel Lights	Check for proper operation of all operator panel and TCG lights.
10	Monitor Light	Check for proper operation of any monitor lights if available.

10-5-6 Optional Diagnostic Checks

Optionally you can access the diagnostic software as described in Chapters 5 or 7. View the error logs and run desired diagnostics.

10-5-6-1 View the Logs

1.) Review the system error log for any problems.

2.) Check the temperature log to see if there are any trends that could cause problems in the future.

10-5-7 Probe Maintenance

Probe Related Checks

Table 10-11 Probe Related Checks

Step	Item	Description
1	Probe Holder	Clean probe holders (they may need to be soaked to remove excess gel).
2	Probes	Thoroughly check the system probe connectors and remove dust from inside the connector sockets if necessary. Visually check for bent, damaged or missing pins

10-5-7-1 Basic Probe Care

The system user manuals and various probe handling cards provide a complete description of probe care, maintenance, cleaning and disinfection. Ensure that you are completely familiar with the proper care of GE probes.

Ultrasound probes can be easily damaged by improper handling. See the User Manual and probe care cards for more details. Failure to follow these precautions can result in serious injury and equipment damage. Failure to properly handle or maintain a probe may also void its warranty.

Any evidence of wear indicates the probe cannot be used.

Do a visual check of the probe pins and system sockets before plugging in a probe.

TEE and Interoperative probes often have special considerations and individual probe user manuals. For TEE and Interoperative probes also refer to their separate user manuals.

10-5-7-2 Basic Probe Cleaning

Refer to the User's Manual for details on probe cleaning.

NOTE: To help protect yourself from blood borne diseases, wear approved disposable gloves. These are made of nitrile derived from vegetable starch to prevent allergic latex reactions.

NOTE: Failure to follow the prescribed cleaning or disinfection procedures will void the probe's warranty. DO NOT soak or wipe the lens with any product not listed in the User Manual. Doing so could result in irreparable damage to the probe. Follow care instructions that came with the probe.

NOTE: Disinfect a defective probe before you return it. Be sure to tag the probe as being disinfected.

Section 10-6
Using a Phantom

See the Basic User Manual "*Customer Maintenance*" for information on using a phantom and quality assurance tests.

Section 10-7
Electrical Safety Tests

10-7-1 Safety Test Overview

The electrical safety tests in this section are based on and conform to NFPA 99 (For USA) and IEC/EN 60601-1 Medical Equipment Safety Standards. They are intended for the electrical safety evaluation of cord-connected, electrically operated, patient care equipment. If additional information is needed, refer to the NFPA 99 (For USA) and IEC/EN 60601-1 documents.

WARNING ***THE USER MUST ENSURE THAT THE SAFETY INSPECTIONS ARE PERFORMED AT LEAST EVERY 12 MONTHS ACCORDING TO THE REQUIREMENTS OF THE PATIENT SAFETY STANDARD IEC-EN 60601-1. ONLY TRAINED PERSONS ARE ALLOWED TO PERFORM THE SAFETY INSPECTIONS MENTIONED ABOVE.***

CAUTION **To avoid electrical shock, the unit under test must not be connected to other electrical equipment. Remove all interconnecting cables and wires. The unit under test must not be contacted by users or patients while performing these tests.**

CAUTION **Possible risk of infection. Do not handle soiled or contaminated probes and other components that have been in patient contact. Follow appropriate cleaning and disinfecting procedures before handling the equipment.**

Test the system, peripherals and probes for leakage current. Excessive leakage current can cause injury or death in sensitive patients. High leakage current can also indicate degradation of insulation and a potential for electrical failure. Do not use probes or equipment having excessive leakage current.

To minimize the risk that a probe may shock someone the customer should:

- Not use a probe that is cracked or damaged in any way
- Check probe leakage current:
    * once a year on surface probes
    * twice a year on endocavitary probes
    * whenever probe damage is suspected

10-7-2 GEMS Leakage Current Limits

The following limits are summarized for NFPA 99 (For USA) and IEC 60601-1 Medical Equipment Safety Standards. These limits are GEMS standards and in some cases are lower than the above standards listed.

Table 10-12 Chassis Leakage Current Limits—Accessible Metal Surfaces

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral
USA	N/A	0.3 mA	0.3 mA	N/A
Other	0.1 mA	0.5 mA	0.5 mA	0.5 mA

Table 10-13 Type BF Applied Part Leakage Current Limits - Non-Conductive (Floating) Surface and Cavity Probes

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	*Mains Applied
USA	0.05 mA	0.05 mA	0.05 mA	0.05 mA	N/A
Other	0.1 mA	0.5 mA	0.5 mA	0.5 mA	5.0 mA

Table 10-14 Type CF Applied Part Leakage Current Limits - Surgical Probes and ECG Connections

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	*Mains Applied
USA	0.01 mA	0.05mA	0.05 mA	N/A	0.025 mA
Other	0.01 mA	0.05 mA	0.05 mA	0.05 mA	0.05 mA

*NOTE: *Mains Applied refers to the sink leakage test where mains (supply) voltage is applied to the part to determine the amount of current that will pass (or sink) to ground if a patient contacted mains voltage.*

The following tests are performed at the factory and should be performed at the site. These tests are: grounding continuity, chassis leakage current, probe leakage current, and ECG leakage current. All measurements are made with an electrical safety analyzer.

10-7-3 Outlet Test - Wiring Arrangement - USA & Canada

Test all outlets in the area for proper grounding and wiring arrangement by plugging in the neon outlet tester and noting the combination of lights that are illuminated. Any problems found should be reported to the hospital immediately and the receptacle should not be used.

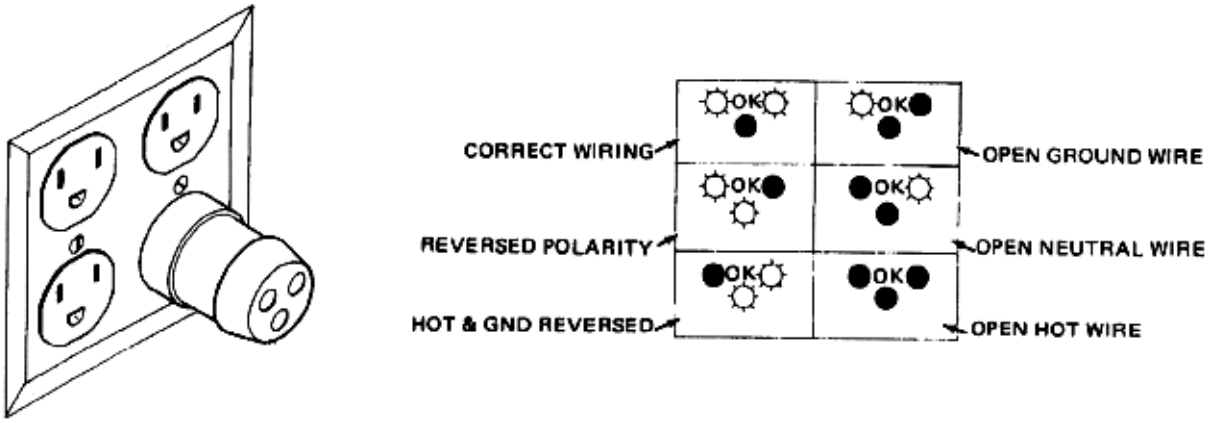


Figure 10-1 Typical Alternate Outlet Tester

NOTE: No outlet tester can detect the condition where the Neutral (grounded supply) conductor and the Grounding (protective earth) conductor are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

10-7-4 Grounding Continuity

CAUTION Electric Shock Hazard. The patient must not be contacted to the equipment during this test

Measure the resistance from the third pin of the attachment plug to the exposed metal parts of the case. The ground wire resistance should be less than **0.2** ohms. Reference the procedure in the IEC 601-1.1.

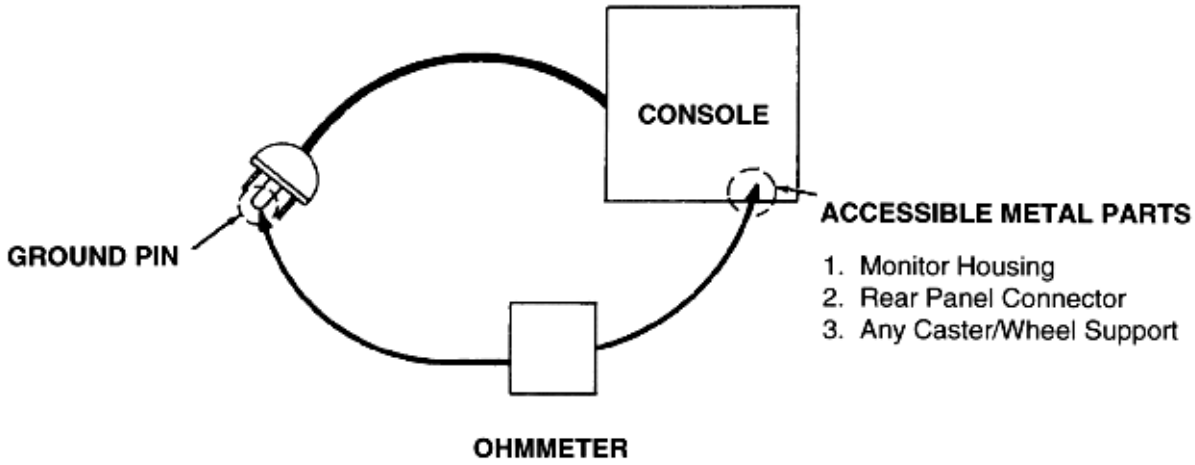


Figure 10-2 Ground Continuity Test

10-7-4-1 Meter Procedure

Follow these steps to test the ground wire resistance.

1.) Turn the LOGIQ™ 3 unit OFF.
2.) Plug the unit into the meter, and the meter into the tested AC wall outlet.
3.) Plug the black chassis cable into the meter's “CHASSIS” connector and attach the black chassis cable clamp to an exposed metal part of the LOGIQ™ 3 unit.
4.) Set the meter's “FUNCTION” switch to the RESISTANCE position.
5.) Set the meter's “POLARITY” switch to the OFF (center) position.
6.) Measure and record the ground wire resistance.

10-7-5 Chassis Leakage Current Test

10-7-5-1 Definition

This test measures the current that would flow in a grounded person who touched accessible metal parts of the bedside station if the ground wire should break. The test verifies the isolation of the power line from the chassis. The meter is connected from accessible metal parts of the case to ground. Measurements should be made with the unit On and Off, with the power line polarity Normal and Reversed. Record the highest reading.

CAUTION Electric Shock Hazard. When the meter's ground switch is OPEN, don't touch the unit!

CAUTION Equipment damage possibility. Never switch the Polarity and the status of Neutral when the unit is powered ON. Be sure to turn the unit power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the unit may be damaged.

10-7-5-2 Generic Procedure

The test verifies the isolation of the power line from the chassis. The testing meter is connected from accessible metal parts of the case to ground. Measurements should be made with the unit ON and OFF, with the power line polarity Normal and Reversed. Record the highest reading of current.

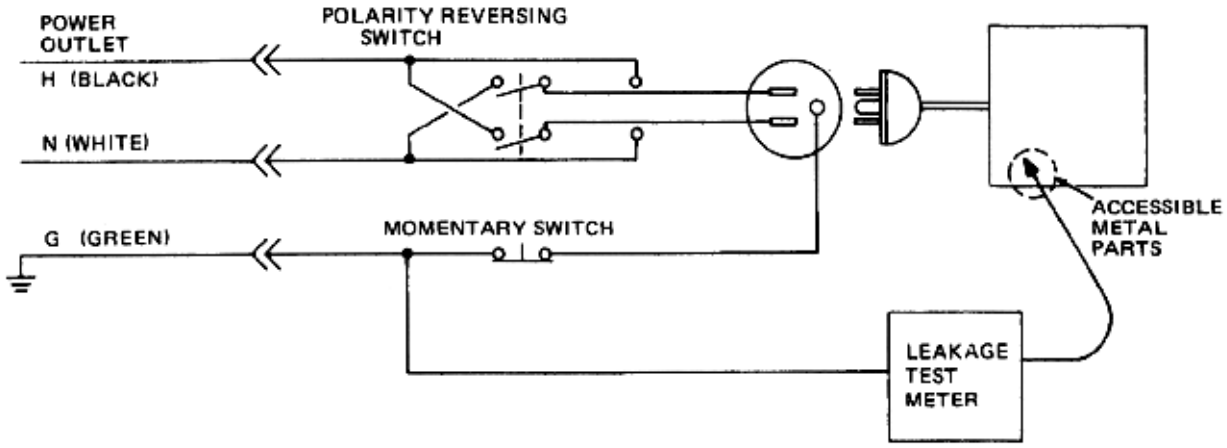


Figure 10-3 Set Up for Chassis Source Leakage Current, IEC 601-1 Clause 19 - Continuos Leakage Currents and Patient, Auxiliary Currents

When using the Microguard or a similar test instrument, its power plug may be inserted into the wall outlet and the equipment under test is plugged into the receptacle on the panel of the meter. This places the meter in the grounding conductor and the current flowing from the case to ground will be indicated in any of the current ranges. The maximum allowable limit for chassis source leakage is shown in Table 10-14.

7.) Follow the test conditions described for respective test points shown in Table 10-17.

Table 10-15 Chassis Leakage Current Test Condition

TEST	CONDITION
1	Mounting screw for probe receptacle
2	Wheel support

Table 10-15 Chassis Leakage Current Test Condition

TEST	CONDITION
3	Mounting screw for CRT housing
4	Mounting screw for peripheral plugged into unit
5	Mounting screw for other peripheral powered by unit

8.) Keep a record of the results with other hard copies of PM data kept on site.

10-7-5-3 Data Sheet for Chassis Source Leakage Current

The test passes when all readings measure less than the value shown in Table 10-14. Record all data on the PM Inspection Certificate.

Table 10-16 Typical Data Sheet for Chassis Source Leakage Current

Unit Power	Tester Polarity Switch	Tester Neutral or Ground Switch	Test 1 Probe Connector Screw	Test 2 Metal on Wheel	Test 3 Screws on CRT Housing	Optional Test 4 Rear Panel Connectors	Optional Test 5
Enter Name of tested peripheral here:							
ON	NORM	OPEN					
ON	NORM	CLOSED					
ON	REV	OPEN					
ON	REV	CLOSED					
OFF	NORM	OPEN					
OFF	NORM	CLOSED					
OFF	REV	OPEN					
OFF	REV	CLOSED					

10-7-6 Isolated Patient Lead (Source) Leakage–Lead to Ground

10-7-6-1 Definition

This test measures the current which would flow to ground from any of the isolated ECG leads. The meter simulates a patient who is connected to the monitoring equipment and is grounded by touching some other grounded surface. Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the ultrasound console Off and On. For each combination the operating controls, such as the lead switch, should be operated to find the worst case condition.

CAUTION **Equipment damage possibility. Never switch the Polarity when the unit is powered ON. Be sure to turn the unit power OFF before switching the polarity using the POLARITY switch. Otherwise, the unit may be damaged.**

10-7-6-2 Generic Procedure

Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the unit Off and On. For each combination, the operating controls such as the lead switch should be operated to find the worst case condition.

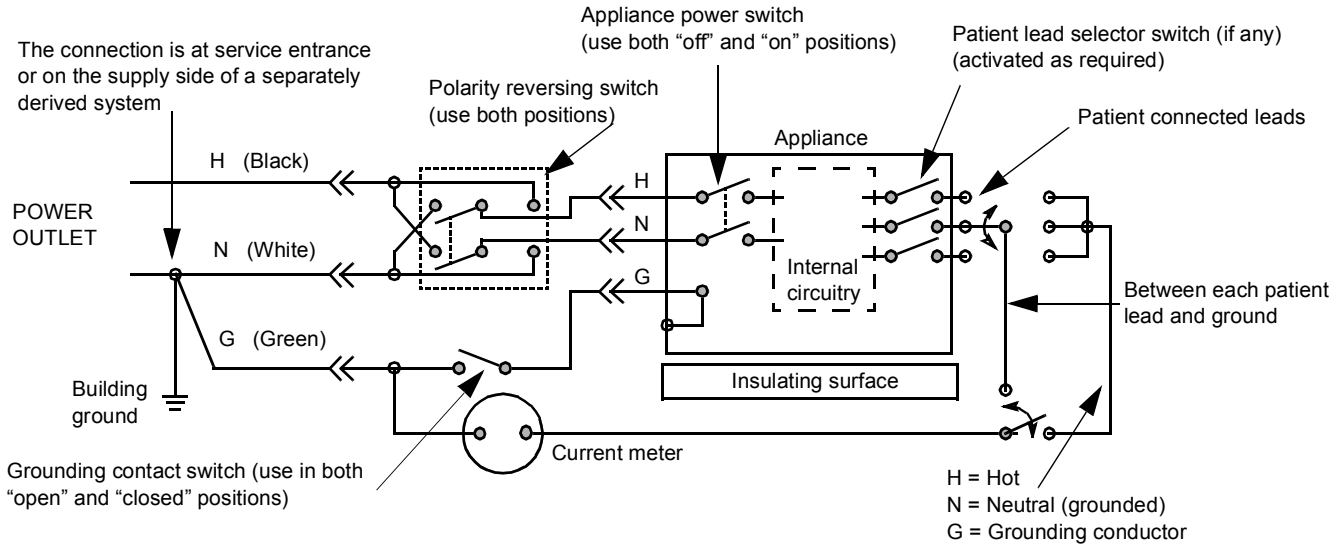

The connection is at service entrance or on the supply side of a separately derived system
Appliance power switch (use both "off" and "on" positions)
Patient lead selector switch (if any) (activated as required)
Polarity reversing switch (use both positions)
Patient connected leads
Appliance
H (Black)
POWER OUTLET
N (White)
H
N
G
Internal circuitry
Between each patient lead and ground
G (Green)
Insulating surface
Building ground
Current meter
Grounding contact switch (use in both "open" and "closed" positions)
H = Hot
N = Neutral (grounded)
G = Grounding conductor

Figure 10-4 Test Circuit for Measuring Non-Isolated Patient Leads

Table 10-17 Testing Power Conditions

ECG Power	Meter's Polarity Switch	Meter's Neutral Switch
ON	NORM	CLOSED
ON	NORM	OPEN
ON	REVERSE	CLOSED
ON	REVERSE	OPEN
OFF	NORM	CLOSED
OFF	NORM	OPEN
OFF	REVERSE	CLOSED
OFF	REVERSE	OPEN

10-7-7 Isolated Patient Lead (Source) Leakage–Lead to Lead

Reference the procedure in the IEC 60601-1. When using the Dale 600, switch the meter's function selector to the LEAD-LEAD position. Select and test each of the five ECG lead positions (except ALL) on the LEAD selector, testing each to the power condition combinations found in the table. Record the highest leakage current measured.

10-7-8 Isolated Patient Lead (Sink) Leakage-Isolation Test

Reference the procedure in the IEC 60601-1. When using the Dale 600, switch the meter's function selector to the LEAD-ISO. Select the ALL position on the lead selector. Depress the rocker switch to ISO TEST to test lead isolation.

CAUTION **Line voltage is applied to the ECG leads during this test. To avoid possible electric shock hazard, the system being tested must not be touched by patients, users or anyone while the ISO TEST switch is depressed.**

NOTE: It is not necessary to test each lead individually or power condition combinations as required in previous tests.

10-7-8-1 Data Sheet for ECG Leakage Current

The test passes when all readings measure less than the value shown in the table below. Record all data on the PM Inspection Certificate.

Table 10-18 Maximum Allowance Limit for ECG Leakage Current

	AC Power Source	Maximum Allowance Limit	
		GROUND OPEN	GROUND CLOSED
Patient Lead to Ground Leakage Current Test and Patient Lead to Lead Leakage Current Test	115V	10uA	10uA
	230V	500uA	10uA

Table 10-19 Maximum Allowance Limit for ECG Leakage Current

	AC Power Source	Maximum Allowance Limit
Patient Lead Isolation Current Test	115V	20uA
	230V	5mA

Table 10-20 Typical Data Sheet for ECG Leakage Current

ECG Power	Tester Polarity Switch	Tester Ground Switch	Tester Lead Selector				
			RL	RA	LA	LL	C
ON	NORM	CLOSED					
ON	REVERSE	CLOSED					
ON	NORM	OPEN					
ON	REVERSE	OPEN					
OFF	NORM	CLOSED					
OFF	REVERSE	CLOSED					
OFF	NORM	OPEN					
OFF	REVERSE	OPEN					

10-7-9 Probe Leakage Current Test

10-7-9-1 Definition

This test measures the current that would flow to ground from any of the probes through a patient who is being scanned and becomes grounded by touching some other grounded surface.

10-7-9-2 Generic Procedure

Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the unit Off and On. For each combination, the probe must be active to find the worst case condition.

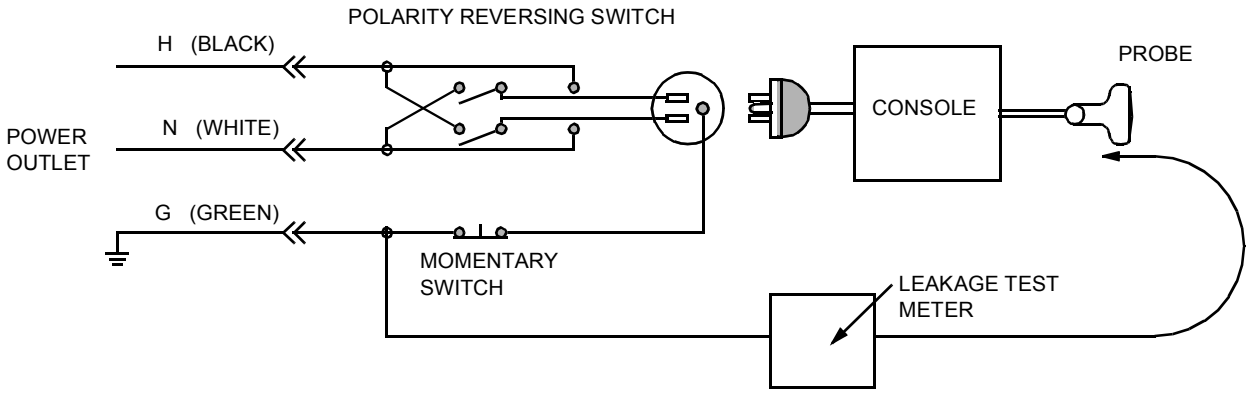


Figure 10-5 Set Up for Probe Leakage Current

NOTE: Each probe will have some amount of leakage current, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement.

10-7-9-3 No Meter Probe Adapter Procedure

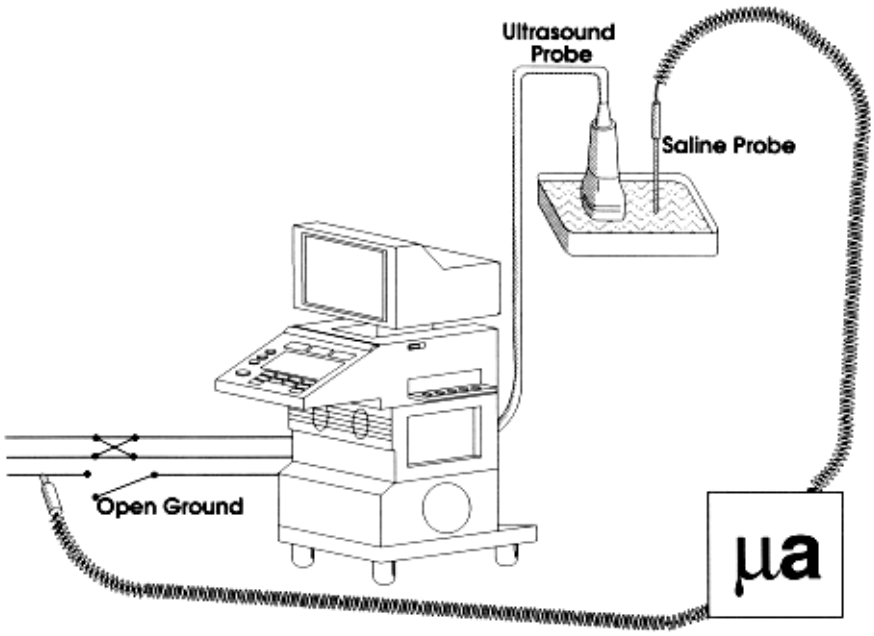


Figure 10-6

Follow these steps to test each transducer for leakage current.

1.) Turn the LOGIQ™ 3 unit OFF.
2.) Plug the unit into the test meter, and the meter into the tested AC wall outlet.
3.) Plug the external probe into the meter's “EXTERNAL” connector.
4.) Set the meter's “FUNCTION” switch to EXTERNAL position.
5.) Connect the probe for test with the connector of the console.
6.) Add the saline probe and the imaging area of the probe into the saline bath.
7.) Have unit power ON for the first part; turn it OFF for the second half.
8.) Depress the ISO TEST rocker switch and record the highest current reading.
9.) Follow the test conditions described in Table 10-23 for every transducer.
10.)Keep a record of the results with other hand copies of PM data.

10-7-9-4 Data Sheet for Transducer Source Leakage Current

The test passes when all readings measure less than the values shown in Table 10-15 and Table 10-16. Record all data on the PM Inspection Certificate.

CAUTION **Equipment damage possibility. Never switch the Polarity and the status of Neutral when the unit is powered ON. Be sure to turn the unit power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the unit may be damaged**

Table 10-21 Typical Data Sheet For Transducer Source Leakage Current

Transducer Tested:			
Unit Power	**Tester Power Polarity Switch**	**Tester GROUND or NUETRAL Switch**	**Measurement**
ON	NORM	OPEN	
ON	NORM	CLOSED	
ON	REV	OPEN	
ON	REV	CLOSED	
OFF	NORM	OPEN	
OFF	NORM	CLOSED	
OFF	REV	OPEN	
OFF	REV	CLOSED	

Section 10-8
When There's Too Much Leakage Current...

CHASSIS FAILS

Check the ground on the power cord and plug for continuity. Ensure the ground is not broken, frayed, or intermittent. Replace any defective part.

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

Test the wall outlet; verify it is grounded and is free of other wiring abnormalities. Notify the user or owner to correct any deviations. As a work around, check the other outlets to see if they could be used instead.

NOTE: No outlet tester can detect the condition where the white neutral wire and the green grounding wire are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

PROBE FAILS

Test the probe in another connector to isolate if the fault lies with the probe or the scanner.

NOTE: Each probe will have some amount of leakage, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. The maximum allowable leakage current for body surface contact probe differs from inter-cavity probe. Be sure to enter the correct probe type in the appropriate space on the check list.

If excessive leakage current is slot dependent, inspect the system connector for bent pins, poor connections, and ground continuity.

If the problem remains with the probe, replace the probe.

PERIPHERAL FAILS

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

STILL FAILS

If all else fails, begin isolation by removing the probes, external peripherals, then the on board ones, one at a time while monitoring the leakage current measurement.

NEW UNIT

If the leakage current measurement tests fail on a new unit and if situation can not be corrected, submit a Safety Failure Report to document the system problem. Remove unit from operation.

ECG FAILS

Inspect cables for damage or poor connections.

ULTRASOUND INSPECTION CERTIFICATE

Customer Name:		System ID:	Dispatch Number / Date Performed:	Warranty/Contract/HBS
System Type		Model Number:	Serial Number:	Manufacture Date:
Probe 1:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 2:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 3:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 4:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 5:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 6:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 7:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 8:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 9:	Frequency:	Scan Format*:	Model Number:	Serial Number:

* Scan Format: Phased Array, Linear Array, Curved Array, Mechanical Array or Other

FUNCTIONAL CHECKS

Functional Check (if applicable)	OK? or N/A
B-Mode Function	
Doppler Modes Function	
CF-Mode Function	
M-Mode Function	
Applicable Software Options	
Applicable Hardware Options	
Control Panel	
Monitor	
Measurement Accuracy	
GE Approved Peripherals	

PHYSICAL INSPECTION AND CLEANING

Physical Inspection and Cleaning (if applicable)	Inspect	Clean
Console		
Monitor		
Air Filter		
Probe Holders		
External I/O		
Wheels, Brakes & Swivel Locks		
Cables and Connectors		
GE Approved Peripherals (VCR, CD-RW, Printers)		

COMMENTS:

_____

_____

_____

ELECTRICAL SAFETY

Electrical Test Performed	Max Value Allowed	Value Measured	OK?	Comments
Outlet (correct ground &wiring config.)				
System Ground Continuity				
Chassis Source Leakage Current - Probe				
Chassis Source Leakage Current - Wheel				
Chassis Source Leakage Current - CRT				
Patient Lead Source Leakage (Lead to Ground)				
Patient Lead Source Leakage (Lead to Lead)				
Patient Lead Source Leakage (Isolation)				
Peripheral 1 Leakage Current				
Peripheral 1Ground Continuity				
Peripheral 2 Leakage Current				
Peripheral 2Ground Continuity				
Peripheral 3 Leakage Current				
Peripheral 3Ground Continuity				

PROBES

Probe Number (from previous page)	Max Value Allowed	Max Value Measured	OK?	Comments
Probe 1:				
Probe 2:				
Probe 3:				
Probe 4:				
Probe 5:				
Probe 6:				
Probe 7:				
Probe 8:				
Probe 9:				

Final Check. All system covers are in place. System scans with all probes as expected.

Accepted by: _____

A
Applications Software
Loading 45
Automatic Troubleshooting 10

B
Backup
Patient Database 33
Preset Configurations 33
Base Load Software
Check Devices 39, 80
Remapping Drive Letters 41, 82
Update 76
Video Adapter Configuration 40, 81
Basic Measurements
Functional Checks 23
Boot Up 12

C
Cine
Functional Checks 25
Color Mode
Overview 20
Connectivity
Worksheet 32
Cooling 2
Customer Assistance 16

E
Electrical Safety 9
EMI Limitations 5
EMI Protection 9
Environmental Conditions
Probes 6

F
Functional Checks
Basic Measurements 23
Image Management 26
Probes/Connector Usage 24
Using Cine 25

G
Gathering Trouble Data 2
General Cleaning 9
ACI Board 16
Air Filter 10
AN KBD 7
Card Cage with BPB 12
Circuit Breaker 16
Conn Board 12
Fan Assy 10
Feeze Key 7
Freeze Key 7
Front Bumper 9
Front Caster 10
Front Cover 9
Front Panel 11
Front Rubber Bumper L 9
Front Rubber Bumper R 9
Fuse 16
Handle 10
Hub Assy 7
KBD Bottom Cover 9
KBD Bumper 9
KBD Rear Cover 9
KeyBoard Assy 7
Left Cover 9
LVPS Assy 16
monitor cover front 5
monitor cover left 5
monitor cover right 5
monitor cover top 5
monitor replace 5
monitor sw assy 5
PCB Boards 12
Powerswitch 7
Probe Holder 7
Pwr_cable 7
Rear Castor 10
Rear Cover 9
Rear Panel Assy 11
Rear Panel Fuse 11
Right Cover 9
RP1 Assy 11
RP2 Assy 11
RPI Assy 11
task lamp 5
TB Assy 7
TGC Assy 7
Top Cover 9
TXFR Assy 16

H
Hazard Icons 5
Human Safety 8

I
Image Management
Functional Checks 26
InSite
IP Address Configuration 33
Installation 1
Installation of Option Software 113
Installation of Software 72

L
Lighting 2

M
Manpower Requirements 6
Mechanical Safety 8
Minimal Floor Plan Suggestion 9
Models Covered 2

P
P4 Key Function 4
Power Off 14
Power On 12
Power-up Procedures
Voltage Settings 9
Prepearing the Unit for Installation 9
Probe Connector Cleaning 11
Probes/Connector Usage
Functional Checks 24
Purchaser Responsibilities 7

R
Receiving and Unpacking the Equipment 3
Regulatory 1
Reliability Testing 12

S
Safety Considerations 8
Screen Captures 4
Service Adjustments 1
Shutdown 14
Software
Base Load Update 76
Loading Application 45
System Maintenance 7

T
Time and Manpower Requirements 6
Trouble Image with Logs 3
Troubleshooting
Gathering Trouble Data 2
Screen Captures 4
Trouble Image with Logs 3
Vital System Information 2

U
Unpacking the Equipment 3, 4

V
Voltage Settings 9

W
Warnings and Cautions 8

GE Medical Systems

GE Medical Systems: Telex 3797371
P.O. Box 414; Milwaukee, Wisconsin 53201, U.S.A.
(Asia, Pacific, Latin America, North America)

GE Ultraschall:Tel: +49 (0) 212 28 02 208
Deutschland GmbH & Co KG
Beethovenstrabe 239, Postfach 11 05 60
D-42655 Solingen, Germany